SEQUENCE LISTING

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<110> Duvick, Jonathan P.
      Gilliam, Jacob T.
      Maddox, Joyce R.
      Crasta, Oswald R.
      Folkerts, Otto


<120> Amino Polyol Amine Oxidase
   Polynucleotides and Related Polypeptides and Methods of Use


<130> 0875C

<150> US 60/092,936
<151> 1998-07-15

<150> US 09/352,168
<151> 1999-07-12

<160> 33

<170> FastSEQ for Windows Version 3.0

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<213> Exophiala spinifera.

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attgtcgatc gacgtcgatg ctggtatctc tggcaaatga gatggggtca cagctcgatt   180
ggaggacgcc cgagaagcct tgttcgcgcc accacggctt gtcccatacg aagactatct   240
tgctatagta gcccaggata gaattttccg ccaatgcttg cttctcggcg ggaagaggtg   300
gtgaaaatgt caaggtggga tacaaggttg tcggtaacga aaccancacc tttttgcttc   360
ggaacacggc gc                                                       372

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tacaaggttg tcggtaacga aaccaccacc tttttgcttc ggaacacggc gcccgaggcc   120
gatcgtactg tacagccgga tgccgactgc tcaatttcag cgacgggggt gttgaggtgc   180
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<213> Artificial Sequence

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<223> Designed oligonucleotide for 3' RACE, N21965

<400> 3
tggtttcgtt accgacaacc ttgtatccc   29

<210> 4
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Desiged oligonucleotide for 5' RACE, N21968

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gagttggtcc cagacagact tttgtcgt   28

<210> 5
<211> 1389
<212> DNA
<213> Exophiala spinifera

<220>
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<222> (1)...(1386)

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gac aac gtt gcg gac gtg gta gtg gtg ggc gct ggc ttg agc ggt ttg      48
Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu
1               5                   10                  15

gag acg gca cgc aaa gtc cag gcc gcc ggt ctg tcc tgc ctc gtt ctt      96
Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu
            20                  25                  30

gag gcg atg gat cgt gta ggg gga aag act ctg agc gta caa tcg ggt     144
Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly
        35                  40                  45

ccc ggc agg acg act atc aac gac ctc ggc gct gcg tgg atc aat gac     192
Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp
    50                  55                  60

agc aac caa agc gaa gta tcc aga ttg ttt gaa aga ttt cat ttg gag     240
Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu
65                  70                  75                  80

ggc gag ctc cag agg acg act gga aat tca atc cat caa gca caa gac     288
Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp
                85                  90                  95

ggt aca acc act aca gct cct tat ggt gac tcc ttg ctg agc gag gag     336
Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu
            100                 105                 110

gtt gca agt gca ctt gcg gaa ctc ctc ccc gta tgg tct cag ctg atc     384
Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile
        115                 120                 125

gaa gag cat agc ctt caa gac ctc aag gcg agc cct cag gcg aag cgg     432
Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg
    130                 135                 140
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ctc gac agt gtg agc ttc gcg cac tac tgt gag aag gaa cta aac ttg          480
Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu
145                 150                 155                 160

cct gct gtt ctc ggc gta gca aac cag atc aca cgc gct ctg ctc ggt          528
Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly
                    165                 170                 175

gtg gaa gcc cac gag atc agc atg ctt ttt ctc acc gac tac atc aag          576
Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys
                180                 185                 190

agt gcc acc ggt ctc agt aat att ttc tcg gac aag aaa gac ggc ggg          624
Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly
                195                 200                 205

cag tat atg cga tgc aaa aca ggt atg cag tcg att tgc cat gcc atg          672
Gln Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met
        210                 215                 220

tca aag gaa ctt gtt cca ggc tca gtg cac ctc aac acc ccc gtc gct          720
Ser Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala
225                 230                 235                 240

gaa att gag cag tcg gca tcc ggc tgt aca gta cga tcg gcc tcg ggc          768
Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly
                    245                 250                 255

gcc gtg ttc cga agc aaa aag gtg gtg gtt tcg tta ccg aca acc ttg          816
Ala Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu
                260                 265                 270

tat ccc acc ttg aca ttt tca cca cct ctt ccc gcc gag aag caa gca          864
Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala
                275                 280                 285

ttg gcg gaa aat tct atc ctg ggc tac tat agc aag ata gtc ttc gta          912
Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val
        290                 295                 300

tgg gac aag ccg tgg tgg cgc gaa caa ggc ttc tcg ggc gtc ctc caa          960
Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln
305                 310                 315                 320

tcg agc tgt gac ccc atc tca ttt gcc aga gat acc agc atc gac gtc         1008
Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val
                    325                 330                 335

gat cga caa tgg tcc att acc tgt ttc atg gtc gga gac ccg gga cgg         1056
Asp Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg
                340                 345                 350

aag tgg tcc caa cag tcc aag cag gta cga caa aag tct gtc tgg gac         1104
Lys Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp
                355                 360                 365

caa ctc cgc gca gcc tac gag aac gcc ggg gcc caa gtc cca gag ccg         1152
Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro
        370                 375                 380

gcc aac gtg ctc gaa atc gag tgg tcg aag cag cag tat ttc caa gga         1200
Ala Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly
```

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                385                390                395                400
gct ccg agc gcc gtc tat ggg ctg aac gat ctc atc aca ctg ggt tcg        1248
Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser
                    405            410            415

gcg ctc aga acg ccg ttc aag agt gtt cat ttc gtt gga acg gag acg        1296
Ala Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr
                    420            425            430

tct tta gtt tgg aaa ggg tat atg gaa ggg gcc ata cga tcg ggt caa        1344
Ser Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln
                    435            440            445

cga ggt gct gca gaa gtt gtg gct agc ctg gtg cca gca gca                1386
Arg Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
        450            455            460

tag                                                                     1389


        <210> 6
        <211> 462
        <212> PRT
        <213> Exophiala spinifera

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Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu
1               5               10                  15
Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu
            20              25                  30
Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly
        35              40                  45
Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp
    50              55                  60
Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu
65              70                  75                  80
Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp
            85              90                  95
Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu
            100             105             110
Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile
        115             120             125
Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg
    130             135             140
Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu
145             150             155             160
Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly
            165             170             175
Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys
            180             185             190
Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly
        195             200             205
Gln Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met
    210             215             220
Ser Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala
225             230             235             240
Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly
            245             250             255
Ala Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu
            260             265             270
Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala
    275             280             285
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Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val
    290                 295                 300
Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln
305                 310                 315                 320
Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val
                325                 330                 335
Asp Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg
                340                 345                 350
Lys Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp
            355                 360                 365
Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro
    370                 375                 380
Ala Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly
385                 390                 395                 400
Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser
                405                 410                 415
Ala Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr
            420                 425                 430
Ser Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln
            435                 440                 445
Arg Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
    450                 455                 460
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<210> 7
<211> 1442
<212> DNA
<213> Exophiala spinifera

<220>
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<221> intron
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<221> CDS
<222> (700)...(1439)

<400> 7
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Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu
1               5                   10                  15

gag acg gca cgc aaa gtc cag gcc gcc ggt ctg tcc tgc ctc gtt ctt    96
Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu
            20                  25                  30

gag gcg atg gat cgt gta ggg gga aag act ctg agc gta caa tcg ggt   144
Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly
        35                  40                  45

ccc ggc agg acg act atc aac gac ctc ggc gct gcg tgg atc aat gac   192
Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp
    50                  55                  60

agc aac caa agc gaa gta tcc aga ttg ttt gaa aga ttt cat ttg gag   240
Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu
65                  70                  75                  80

ggc gag ctc cag agg acg act gga aat tca atc cat caa gca caa gac   288
Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp
                85                  90                  95
```

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ggt aca acc act aca gct cct tat ggt gac tcc ttg ctg agc gag gag     336
Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu
            100             105             110

gtt gca agt gca ctt gcg gaa ctc ctc ccc gta tgg tct cag ctg atc     384
Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile
            115             120             125

gaa gag cat agc ctt caa gac ctc aag gcg agc cct cag gcg aag cgg     432
Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg
        130             135             140

ctc gac agt gtg agc ttc gcg cac tac tgt gag aag gaa cta aac ttg     480
Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu
145             150             155             160

cct gct gtt ctc ggc gta gca aac cag atc aca cgc gct ctg ctc ggt     528
Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly
            165             170             175

gtg gaa gcc cac gag atc agc atg ctt ttt ctc acc gac tac atc aag     576
Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys
            180             185             190

agt gcc acc ggt ctc agt aat att ttc tcg gac aag aaa gac ggc ggg     624
Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly
            195             200             205

cag tat gtg cga tgc aaa aca g gtgcgtgtgg tgtcgtctca ggtgggggac      676
Gln Tyr Val Arg Cys Lys Thr
        210             215

tcgtttctca gtggtcattc cag gt atg cag tcg att tgc cat gcc atg tca    728
                          Gly Met Gln Ser Ile Cys His Ala Met Ser
                                          220                 225

aag gaa ctt gtt cca ggc tca gtg cac ctc aac acc ccc gtc gct gaa     776
Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala Glu
                230             235             240

att gag cag tcg gca tcc ggc tgt aca gta cga tcg gcc tcg ggc gcc     824
Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala
            245             250             255

gtg ttc cga agc aaa aag gtg gtg gtt tcg tta ccg aca acc ttg tat     872
Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr
            260             265             270

ccc acc ttg aca ttt tca cca cct ctt ccc gcc gag aag caa gca ttg     920
Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu
        275             280             285

gcg gaa aat tct atc ctg ggc tac tat agc aag ata gtc ttc gta tgg     968
Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp
290             295             300             305

gac aag ccg tgg tgg cgc gaa caa ggc ttc tcg ggc gtc ctc caa tcg    1016
Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser
                310             315             320

agc tgt gac ccc atc tca ttt gcc aga gat acc agc atc gac gtc gat    1064
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Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp
            325                 330                 335

cga caa tgg tcc att acc tgt ttc atg gtc gga gac ccg gga cgg aag      1112
Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys
            340                 345                 350

tgg tcc caa cag tcc aag cag gta cga caa aag tct gtc tgg gac caa      1160
Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln
            355                 360                 365

ctc cgc gca gcc tac gag aac gcc ggg gcc caa gtc cca gag ccg gcc      1208
Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala
370                 375                 380                 385

aac gtg ctc gaa atc gag tgg tcg aag cag cag tat ttc caa gga gct      1256
Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala
                390                 395                 400

ccg agc gcc gtc tat ggg ctg aac gat ctc atc aca ctg ggt tcg gcg      1304
Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala
            405                 410                 415

ctc aga acg ccg ttc aag agt gtt cat ttc gtt gga acg gag acg tct      1352
Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr Ser
            420                 425                 430

tta gtt tgg aaa ggg tat atg gaa ggg gcc ata cga tcg ggt caa cga      1400
Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg
            435                 440                 445

ggt gct gca gaa gtt gtg gct agc ctg gtg cca gca gca tag             1442
Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
450                 455                 460


        <210> 8
        <211> 462
        <212> PRT
        <213> Exophiala spinifera

        <400> 8
Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu
1               5                   10                  15
Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu
            20                  25                  30
Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly
        35                  40                  45
Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp
    50                  55                  60
Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu
65                  70                  75                  80
Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp
            85                  90                  95
Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu
            100                 105                 110
Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile
        115                 120                 125
Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg
    130                 135                 140
Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu
145                 150                 155                 160
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Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly
165   170   175
Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys
        180   185   190
Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly
        195   200   205
Gln Tyr Val Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met
210   215   220
Ser Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala
225   230   235   240
Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly
            245   250   255
Ala Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu
            260   265   270
Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala
        275   280   285
Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val
        290   295   300
Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln
305   310   315   320
Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val
            325   330   335
Asp Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg
            340   345   350
Lys Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp
        355   360   365
Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro
    370   375   380
Ala Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly
385   390   395   400
Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser
            405   410   415
Ala Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr
        420   425   430
Ser Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln
        435   440   445
Arg Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
    450   455   460

        <210> 9
        <211> 458
        <212> PRT
        <213> Exophiala spinifera

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Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu
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Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu
            20   25   30
Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly
        35   40   45
Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp
    50   55   60
Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu
65   70   75   80
Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp
            85   90   95
Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu
        100   105   110
Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile
        115   120   125
Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg

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                130                      135                      140
Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu
145                      150                      155                      160
Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly
                        165                      170                      175
Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys
                180                      185                      190
Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly
                195                      200                      205
Gln Tyr Val Arg Cys Lys Thr Gly Ala Cys Gly Val Val Ser Gly Gly
        210                      215                      220
Gly Leu Val Ser Gln Trp Ser Phe Gln Val Cys Ser Arg Phe Ala Met
225                      230                      235                      240
Pro Cys Gln Arg Asn Leu Phe Gln Ala Gln Cys Thr Ser Thr Pro Pro
                        245                      250                      255
Ser Leu Lys Leu Ser Ser Arg His Pro Ala Val Gln Tyr Asp Arg Pro
                260                      265                      270
Arg Ala Pro Cys Ser Glu Ala Lys Arg Trp Trp Phe Arg Tyr Arg Gln
                275                      280                      285
Pro Cys Ile Pro Pro His Phe His His Leu Phe Pro Pro Arg Ser Lys
        290                      295                      300
His Trp Arg Lys Ile Leu Ser Trp Ala Thr Ile Ala Arg Ser Ser Tyr
305                      310                      315                      320
Gly Thr Ser Arg Gly Gly Ala Asn Lys Ala Ser Arg Ala Ser Ser Asn
                        325                      330                      335
Arg Ala Val Thr Pro Ser His Leu Pro Glu Ile Pro Ala Ser Thr Ser
                340                      345                      350
Ile Asp Asn Gly Pro Leu Pro Val Ser Trp Ser Glu Thr Arg Asp Gly
                355                      360                      365
Ser Gly Pro Asn Ser Pro Ser Arg Tyr Asp Lys Ser Leu Ser Gly Thr
        370                      375                      380
Asn Ser Ala Gln Pro Thr Arg Thr Pro Gly Pro Lys Ser Gln Ser Arg
385                      390                      395                      400
Pro Thr Cys Ser Lys Ser Ser Gly Arg Ser Ser Ser Ile Ser Lys Glu
                        405                      410                      415
Leu Arg Ala Pro Ser Met Gly Thr Ile Ser Ser His Trp Val Arg Arg
                420                      425                      430
Ser Glu Arg Arg Ser Arg Val Phe Ile Ser Leu Glu Arg Arg Arg Leu
        435                      440                      445
Phe Gly Lys Gly Ile Trp Lys Gly Pro Tyr
    450                      455
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    <211> 1392
    <212> DNA
    <213> Exophiala spinifera

    <220>
    <221> CDS
    <222> (1)...(1389)

    <221> misc_feature
    <222> (1)...(3)
    <223> Extra lysine in K:trAPAO

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aaa gac aac gtt gcg gac gtg gta gtg gtg ggc gct ggc ttg agc ggt      48
Lys Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly
1               5                       10                      15

ttg gag acg gca cgc aaa gtc cag gcc gcc ggt ctg tcc tgc ctc gtt      96
Leu Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val
```

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                    20                      25                      30

ctt gag gcg atg gat cgt gta ggg gga aag act ctg agc gta caa tcg    144
Leu Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser
        35                      40                      45

ggt ccc ggc agg acg act atc aac gac ctc ggc gct gcg tgg atc aat    192
Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn
        50                      55                      60

gac agc aac caa agc gaa gta tcc aga ttg ttt gaa aga ttt cat ttg    240
Asp Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu
65                      70                      75                  80

gag ggc gag ctc cag agg acg act gga aat tca atc cat caa gca caa    288
Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln
                85                      90                      95

gac ggt aca acc act aca gct cct tat ggt gac tcc ttg ctg agc gag    336
Asp Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu
                100                     105                     110

gag gtt gca agt gca ctt gcg gaa ctc ctc ccc gta tgg tct cag ctg    384
Glu Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu
        115                     120                     125

atc gaa gag cat agc ctt caa gac ctc aag gcg agc cct cag gcg aag    432
Ile Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys
        130                     135                     140

cgg ctc gac agt gtg agc ttc gcg cac tac tgt gag aag gaa cta aac    480
Arg Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn
145                     150                     155                 160

ttg cct gct gtt ctc ggc gta gca aac cag atc aca cgc gct ctg ctc    528
Leu Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu
                165                     170                     175

ggt gtg gaa gcc cac gag atc agc atg ctt ttt ctc acc gac tac atc    576
Gly Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile
                180                     185                     190

aag agt gcc acc ggt ctc agt aat att ttc tcg gac aag aaa gac ggc    624
Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly
        195                     200                     205

ggg cag tat atg cga tgc aaa aca ggt atg cag tcg att tgc cat gcc    672
Gly Gln Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala
        210                     215                     220

atg tca aag gaa ctt gtt cca ggc tca gtg cac ctc aac acc ccc gtc    720
Met Ser Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val
225                     230                     235                 240

gct gaa att gag cag tcg gca tcc ggc tgt aca gta cga tcg gcc tcg    768
Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser
                245                     250                     255

ggc gcc gtg ttc cga agc aaa aag gtg gtg gtt tcg tta ccg aca acc    816
Gly Ala Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr
        260                     265                     270
```

```
ttg tat ccc acc ttg aca ttt tca cca cct ctt ccc gcc gag aag caa       864
Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln
        275                 280                 285

gca ttg gcg gaa aat tct atc ctg ggc tac tat agc aag ata gtc ttc       912
Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe
        290                 295                 300

gta tgg gac aag ccg tgg tgg cgc gaa caa ggc ttc tcg ggc gtc ctc       960
Val Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu
305                 310                 315                 320

caa tcg agc tgt gac ccc atc tca ttt gcc aga gat acc agc atc gac      1008
Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp
                325                 330                 335

gtc gat cga caa tgg tcc att acc tgt ttc atg gtc gga gac ccg gga      1056
Val Asp Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly
                340                 345                 350

cgg aag tgg tcc caa cag tcc aag cag gta cga caa aag tct gtc tgg      1104
Arg Lys Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp
            355                 360                 365

gac caa ctc cgc gca gcc tac gag aac gcc ggg gcc caa gtc cca gag      1152
Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu
        370                 375                 380

ccg gcc aac gtg ctc gaa atc gag tgg tcg aag cag cag tat ttc caa      1200
Pro Ala Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln
385                 390                 395                 400

gga gct ccg agc gcc gtc tat ggg ctg aac gat ctc atc aca ctg ggt      1248
Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly
                405                 410                 415

tcg gcg ctc aga acg ccg ttc aag agt gtt cat ttc gtt gga acg gag      1296
Ser Ala Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu
                420                 425                 430

acg tct tta gtt tgg aaa ggg tat atg gaa ggg gcc ata cga tcg ggt      1344
Thr Ser Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly
            435                 440                 445

caa cga ggt gct gca gaa gtt gtg gct agc ctg gtg cca gca gca        1389
Gln Arg Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
    450                 455                 460

tag                                                                   1392
```

```
    <210> 11
    <211> 463
    <212> PRT
    <213> Exophiala spinifera

    <220>
    <223> Extra lysine in the polypeptide sequence of
          K:trAPAO, 463 aa.

    <400> 11
Lys Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly
1               5                   10                  15
```

```
Leu Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val
            20                  25                  30
Leu Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser
            35                  40                  45
Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn
        50                  55                  60
Asp Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu
65                  70                  75                  80
Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln
                85                  90                  95
Asp Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu
            100                 105                 110
Glu Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu
        115                 120                 125
Ile Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys
    130                 135                 140
Arg Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn
145                 150                 155                 160
Leu Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu
                165                 170                 175
Gly Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile
            180                 185                 190
Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly
        195                 200                 205
Gly Gln Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala
    210                 215                 220
Met Ser Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val
225                 230                 235                 240
Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser
                245                 250                 255
Gly Ala Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr
            260                 265                 270
Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln
        275                 280                 285
Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe
    290                 295                 300
Val Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu
305                 310                 315                 320
Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp
                325                 330                 335
Val Asp Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly
            340                 345                 350
Arg Lys Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp
        355                 360                 365
Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu
    370                 375                 380
Pro Ala Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln
385                 390                 395                 400
Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly
                405                 410                 415
Ser Ala Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu
            420                 425                 430
Thr Ser Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly
        435                 440                 445
Gln Arg Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
    450                 455                 460
```

<210> 12
<211> 34
<212> DNA
<213> Artificial Sequence

```
<220>
<223> Primer sequence designed for cloning DNA into
      expression vectors, N23256

<400> 12
ggggaattca aagacaacgt tgcggacgtg gtag                    34

<210> 13
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer sequence designed for cloning DNA into
      expression vectors, N23259

<400> 13
ggggcggccg cctatgctgc tggcaccagg ctag                    34

<210> 14
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide for 3' RACE, N21965

<400> 14
tggtttcgtt accgacaacc ttgtatccc                          29

<210> 15
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide for 5' race, N21968

<400> 15
gagttggtcc cagacagact tttgtcgt                           28

<210> 16
<211> 1673
<212> DNA
<213> Exophiala spinifera

<220>
<221> sig_peptide
<222> (1)...(267)
<223> yeast alpha mating factor secretion signal.

<221> CDS
<222> (1)...(1662)

<400> 16
atg aga ttt cct tca att ttt act gct gtt tta ttc gca gca tcc tcc    48
Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser
            -85               -80               -75

gca tta gct gct cca gtc aac act aca aca gaa gat gaa acg gca caa    96
Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln
            -70               -65               -60
```

```
att ccg gct gaa gct gtc atc ggt tac tca gat tta gaa ggg gat ttc      144
Ile Pro Ala Glu Ala Val Ile Gly Tyr Ser Asp Leu Glu Gly Asp Phe
        -55                     -50                 -45

gat gtt gct gtt ttg cca ttt tcc aac agc aca aat aac ggg tta ttg      192
Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu
    -40                 -35                 -30

ttt ata aat act act att gcc agc att gct gct aaa gaa gaa ggg gta      240
Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val
-25                 -20                 -15                 -10

tct ctc gag aaa aga gag gct gaa gct gaa ttc aaa gac aac gtt gcg      288
Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Lys Asp Asn Val Ala
            -5                      1                   5

gac gtg gta gtg gtg ggc gct ggc ttg agc ggt ttg gag acg gca cgc      336
Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg
        10                  15                  20

aaa gtc cag gcc gcc ggt ctg tcc tgc ctc gtt ctt gag gcg atg gat      384
Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp
    25                  30                  35

cgt gta ggg gga aag act ctg agc gta caa tcg ggt ccc ggc agg acg      432
Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr
40                  45                  50                  55

act atc aac gac ctc ggc gct gcg tgg atc aat gac agc aac caa agc      480
Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser
            60                  65                  70

gaa gta tcc aga ttg ttt gaa aga ttt cat ttg gag ggc gag ctc cag      528
Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln
            75                  80                  85

agg acg act gga aat tca atc cat caa gca caa gac ggt aca acc act      576
Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr
        90                  95                  100

aca gct cct tat ggt gac tcc ttg ctg agc gag gag gtt gca agt gca      624
Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala
        105                 110                 115

ctt gcg gaa ctc ctc ccc gta tgg tct cag ctg atc gaa gag cat agc      672
Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser
120                 125                 130                 135

ctt caa gac ctc aag gcg agc cct cag gcg aag cgg ctc gac agt gtg      720
Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val
            140                 145                 150

agc ttc gcg cac tac tgt gag aag gaa cta aac ttg cct gct gtt ctc      768
Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu
            155                 160                 165

ggc gta gca aac cag atc aca cgc gct ctg ctc ggt gtg gaa gcc cac      816
Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His
        170                 175                 180

gag atc agc atg ctt ttt ctc acc gac tac atc aag agt gcc acc ggt      864
```

```
Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly
    185                 190             195

ctc agt aat att ttc tcg gac aag aaa gac ggc ggg cag tat atg cga    912
Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg
200                 205             210                 215

tgc aaa aca ggt atg cag tcg att tgc cat gcc atg tca aag gaa ctt    960
Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu
                220             225             230

gtt cca ggc tca gtg cac ctc aac acc ccc gtc gct gaa att gag cag   1008
Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln
                235             240             245

tcg gca tcc ggc tgt aca gta cga tcg gcc tcg ggc gcc gtg ttc cga   1056
Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg
            250             255             260

agc aaa aag gtg gtg gtt tcg tta ccg aca acc ttg tat ccc acc ttg   1104
Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu
        265             270             275

aca ttt tca cca cct ctt ccc gcc gag aag caa gca ttg gcg gaa aat   1152
Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn
280             285             290             295

tct atc ctg ggc tac tat agc aag ata gtc ttc gta tgg gac aag ccg   1200
Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro
                300             305             310

tgg tgg cgc gaa caa ggc ttc tcg ggc gtc ctc caa tcg agc tgt gac   1248
Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp
            315             320             325

ccc atc tca ttt gcc aga gat acc agc atc gac gtc gat cga caa tgg   1296
Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp
        330             335             340

tcc att acc tgt ttc atg gtc gga gac ccg gga cgg aag tgg tcc caa   1344
Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln
    345             350             355

cag tcc aag cag gta cga caa aag tct gtc tgg gac caa ctc cgc gca   1392
Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala
360             365             370             375

gcc tac gag aac gcc ggg gcc caa gtc cca gag ccg gcc aac gtg ctc   1440
Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu
                380             385             390

gaa atc gag tgg tcg aag cag cag tat ttc caa gga gct ccg agc gcc   1488
Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala
            395             400             405

gtc tat ggg ctg aac gat ctc atc aca ctg ggt tcg gcg ctc aga acg   1536
Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr
        410             415             420

ccg ttc aag agt gtt cat ttc gtt gga acg gag acg tct tta gtt tgg   1584
Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp
    425             430             435
```

```
aaa ggg tat atg gaa ggg gcc ata cga tcg ggt caa cga ggt gct gca        1632
Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala
440             445             450                 455

gaa gtt gtg gct agc ctg gtg cca gca gca taggcggccg c                   1673
Glu Val Val Ala Ser Leu Val Pro Ala Ala
                460             465
```

```
<210> 17
<211> 554
<212> PRT
<213> Exophiala spinifera

<220>
<221> SIGNAL
<222> (1)...(89)
<223> yeast alpha mating factor secretion signal.

<400> 17
Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser
            -85             -80             -75
Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln
        -70             -65             -60
Ile Pro Ala Glu Ala Val Ile Gly Tyr Ser Asp Leu Glu Gly Asp Phe
        -55             -50             -45
Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu
    -40             -35             -30
Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val
-25             -20             -15                     -10
Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Lys Asp Asn Val Ala
            -5              1               5
Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg
        10              15              20
Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp
    25              30              35
Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr
40              45              50                      55
Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser
            60              65              70
Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln
            75              80              85
Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr
            90              95              100
Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala
    105             110             115
Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser
120             125             130                     135
Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val
            140             145             150
Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu
            155             160             165
Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His
            170             175             180
Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly
            185             190             195
Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg
200             205             210             215
Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu
            220             225             230
Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln
```

```
                235                   240                   245
Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg
        250                   255                   260
Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu
        265                   270                   275
Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn
280                   285                   290                   295
Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro
                300                   305                   310
Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp
            315                   320                   325
Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp
        330                   335                   340
Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln
        345                   350                   355
Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala
360                   365                   370                   375
Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu
                380                   385                   390
Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala
            395                   400                   405
Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr
        410                   415                   420
Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp
        425                   430                   435
Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala
440                   445                   450                   455
Glu Val Val Ala Ser Leu Val Pro Ala Ala
                460                   465
```

```
<210> 18
<211> 2079
<212> DNA
<213> Unknown

<220>
<221> CDS
<222> (1)...(2076)

<223> GST:K:trAPAO 2079 nt. Translation starting at nt 1
      - 687, gst fusion + polylinker; 688-2076,
      K:trAPAO; 2077-2079, stop codon. For bacterial
      expression.

<221> misc_feature
<222> (1)...(687)
<223> gst fusion + polylinker

<221> misc_feature
<222> (688)...(2076)
<223> K:trAPAO

<221> misc_feature
<222> (688)...(690)
<223> Extra lysine

<400> 18
atg tcc cct ata cta ggt tat tgg aaa att aag ggc ctt gtg caa ccc      48
Met Ser Pro Ile Leu Gly Tyr Trp Lys Ile Lys Gly Leu Val Gln Pro
1               5                   10                  15

act cga ctt ctt ttg gaa tat ctt gaa gaa aaa tat gaa gag cat ttg      96
```

```
Thr Arg Leu Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu
        20                  25                  30

tat gag cgc gat gaa ggt gat aaa tgg cga aac aaa aag ttt gaa ttg    144
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
        35                  40                  45

ggt ttg gag ttt ccc aat ctt cct tat tat att gat ggt gat gtt aaa   192
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys
        50                  55                  60

tta aca cag tct atg gcc atc ata cgt tat ata gct gac aag cac aac   240
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65                  70                  75                  80

atg ttg ggt ggt tgt cca aaa gag cgt gca gag att tca atg ctt gaa   288
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
                85                  90                  95

gga gcg gtt ttg gat att aga tac ggt gtt tcg aga att gca tat agt   336
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
            100                 105                 110

aaa gac ttt gaa act ctc aaa gtt gat ttt ctt agc aag cta cct gaa   384
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
            115                 120                 125

atg ctg aaa atg ttc gaa gat cgt tta tgt cat aaa aca tat tta aat   432
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
            130                 135                 140

ggt gat cat gta acc cat cct gac ttc atg ttg tat gac gct ctt gat   480
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
145                 150                 155                 160

gtt gtt tta tac atg gac cca atg tgc ctg gat gcg ttc cca aaa tta   528
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
                165                 170                 175

gtt tgt ttt aaa aaa cgt att gaa gct atc cca caa att gat aag tac   576
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
            180                 185                 190

ttg aaa tcc agc aag tat ata gca tgg cct ttg cag ggc tgg caa gcc   624
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
            195                 200                 205

acg ttt ggt ggt ggc gac cat cct cca aaa tcg gat ctg gtt ccg cgt   672
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
        210                 215                 220

gga tcc ccg gaa ttc aaa gac aac gtt gcg gac gtg gta gtg gtg ggc   720
Gly Ser Pro Glu Phe Lys Asp Asn Val Ala Asp Val Val Val Val Gly
225                 230                 235                 240

gct ggc ttg agc ggt ttg gag acg gca cgc aaa gtc cag gcc gcc ggt   768
Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val Gln Ala Ala Gly
                245                 250                 255

ctg tcc tgc ctc gtt ctt gag gcg atg gat cgt gta ggg gga aag act   816
Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val Gly Gly Lys Thr
            260                 265                 270
```

```
ctg agc gta caa tcg ggt ccc ggc agg acg act atc aac gac ctc ggc        864
Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly
        275             280                 285

gct gcg tgg atc aat gac agc aac caa agc gaa gta tcc aga ttg ttt        912
Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val Ser Arg Leu Phe
        290             295                 300

gaa aga ttt cat ttg gag ggc gag ctc cag agg acg act gga aat tca        960
Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser
305             310                 315                 320

atc cat caa gca caa gac ggt aca acc act aca gct cct tat ggt gac       1008
Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp
                325             330                 335

tcc ttg ctg agc gag gag gtt gca agt gca ctt gcg gaa ctc ctc ccc      1056
Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala Glu Leu Leu Pro
                340             345                 350

gta tgg tct cag ctg atc gaa gag cat agc ctt caa gac ctc aag gcg      1104
Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln Asp Leu Lys Ala
                355             360                 365

agc cct cag gcg aag cgg ctc gac agt gtg agc ttc gcg cac tac tgt      1152
Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe Ala His Tyr Cys
        370             375                 380

gag aag gaa cta aac ttg cct gct gtt ctc ggc gta gca aac cag atc      1200
Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val Ala Asn Gln Ile
385             390                 395                 400

aca cgc gct ctg ctc ggt gtg gaa gcc cac gag atc agc atg ctt ttt      1248
Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile Ser Met Leu Phe
                405             410                 415

ctc acc gac tac atc aag agt gcc acc ggt ctc agt aat att ttc tcg      1296
Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser
                420             425                 430

gac aag aaa gac ggc ggg cag tat atg cga tgc aaa aca ggt atg cag      1344
Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys Thr Gly Met Gln
        435             440                 445

tcg att tgc cat gcc atg tca aag gaa ctt gtt cca ggc tca gtg cac      1392
Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro Gly Ser Val His
        450             455                 460

ctc aac acc ccc gtc gct gaa att gag cag tcg gca tcc ggc tgt aca      1440
Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr
465             470                 475                 480

gta cga tcg gcc tcg ggc gcc gtg ttc cga agc aaa aag gtg gtg gtt      1488
Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys Lys Val Val Val
                485             490                 495

tcg tta ccg aca acc ttg tat ccc acc ttg aca ttt tca cca cct ctt      1536
Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu
                500             505                 510

ccc gcc gag aag caa gca ttg gcg gaa aat tct atc ctg ggc tac tat      1584
```

```
Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr
        515             520             525

agc aag ata gtc ttc gta tgg gac aag ccg tgg tgg cgc gaa caa ggc    1632
Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly
        530             535             540

ttc tcg ggc gtc ctc caa tcg agc tgt gac ccc atc tca ttt gcc aga    1680
Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg
545             550             555             560

gat acc agc atc gac gtc gat cga caa tgg tcc att acc tgt ttc atg    1728
Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile Thr Cys Phe Met
                565             570             575

gtc gga gac ccg gga cgg aag tgg tcc caa cag tcc aag cag gta cga    1776
Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser Lys Gln Val Arg
            580             585             590

caa aag tct gtc tgg gac caa ctc cgc gca gcc tac gag aac gcc ggg    1824
Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly
        595             600             605

gcc caa gtc cca gag ccg gcc aac gtg ctc gaa atc gag tgg tcg aag    1872
Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile Glu Trp Ser Lys
        610             615             620

cag cag tat ttc caa gga gct ccg agc gcc gtc tat ggg ctg aac gat    1920
Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp
625             630             635             640

ctc atc aca ctg ggt tcg gcg ctc aga acg ccg ttc aag agt gtt cat    1968
Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe Lys Ser Val His
                645             650             655

ttc gtt gga acg gag acg tct tta gtt tgg aaa ggg tat atg gaa ggg    2016
Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly Tyr Met Glu Gly
            660             665             670

gcc ata cga tcg ggt caa cga ggt gct gca gaa gtt gtg gct agc ctg    2064
Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val Val Ala Ser Leu
        675             680             685

gtg cca gca gca tag                                                 2079
Val Pro Ala Ala
690


    <210> 19
    <211> 692
    <212> PRT
    <213> Unknown

    <220>
    <223> GST:K:trAPAO; GST + linker, aa 1-229; K:trAPAO, aa
          230-692

    <400> 19
Met Ser Pro Ile Leu Gly Tyr Trp Lys Ile Lys Gly Leu Val Gln Pro
1               5               10              15
Thr Arg Leu Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu
        20              25              30
```

```
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
        35              40              45
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys
    50              55              60
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65              70              75              80
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
            85              90              95
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
        100             105             110
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
        115             120             125
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
    130             135             140
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
145             150             155             160
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
            165             170             175
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
            180             185             190
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
        195             200             205
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
    210             215             220
Gly Ser Pro Glu Phe Lys Asp Asn Val Ala Asp Val Val Val Val Gly
225             230             235             240
Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val Gln Ala Ala Gly
            245             250             255
Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val Gly Gly Lys Thr
        260             265             270
Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly
    275             280             285
Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val Ser Arg Leu Phe
    290             295             300
Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser
305             310             315             320
Ile His Gln Ala Gln Asp Gly Thr Thr Thr Ala Pro Tyr Gly Asp
            325             330             335
Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala Glu Leu Leu Pro
        340             345             350
Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln Asp Leu Lys Ala
    355             360             365
Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe Ala His Tyr Cys
    370             375             380
Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val Ala Asn Gln Ile
385             390             395             400
Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile Ser Met Leu Phe
            405             410             415
Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser
        420             425             430
Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys Thr Gly Met Gln
        435             440             445
Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro Gly Ser Val His
    450             455             460
Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr
465             470             475             480
Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys Lys Val Val Val
            485             490             495
Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu
        500             505             510
Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr
        515             520             525
```

```
Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly
    530                 535             540
Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg
545                 550             555                 560
Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile Thr Cys Phe Met
                565             570                 575
Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser Lys Gln Val Arg
            580             585             590
Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly
        595             600             605
Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile Glu Trp Ser Lys
    610             615             620
Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp
625             630             635                 640
Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe Lys Ser Val His
            645             650                 655
Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly Tyr Met Glu Gly
            660             665             670
Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val Val Ala Ser Leu
    675             680             685
Val Pro Ala Ala
    690
```

```
    <210> 20
    <211> 1464
    <212> DNA
    <213> Unknown

    <220>
    <221> sig_peptide
    <222> (1)...(72)
    <223> Barley Alpha Amylase signal sequence.

    <221> misc_feature
    <222> (73)...(1464)
    <223> K:trAPAOcDNA

    <221> CDS
    <222> (1)...(1461)

    <223> Nucleotide sequence of K:trAPAO translational
          fusion with barley alpha amylase signal sequence,
          for expression and secretion of the mature trAPAO
          in maize. Nucleotides 1-72, barley alpha amylase
          signal sequence, nucleotides 73-75, added lysine
          residue; nucleotides 76 -1464 , trAPAO cDNA.

    <221> misc_feature
    <222> (73)...(75)
    <223> Added lysine residue

    <400> 20
atg gcc aac aag cac ctg agc ctc tcc ctc ttc ctc gtg ctc ctc ggc        48
Met Ala Asn Lys His Leu Ser Leu Ser Leu Phe Leu Val Leu Leu Gly
            -20             -15                 -10

ctc tcc gcc tcc ctc gcc agc ggc aaa gac aac gtt gcg gac gtg gta        96
Leu Ser Ala Ser Leu Ala Ser Gly Lys Asp Asn Val Ala Asp Val Val
            -5              1               5

gtg gtg ggc gct ggc ttg agc ggt ttg gag acg gca cgc aaa gtc cag       144
Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val Gln
```

```
                  10                        15                        20

gcc gcc ggt ctg tcc tgc ctc gtt ctt gag gcg atg gat cgt gta ggg        192
Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val Gly
 25                  30                  35                  40

gga aag act ctg agc gta caa tcg ggt ccc ggc agg acg act atc aac        240
Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile Asn
                     45                  50                  55

gac ctc ggc gct gcg tgg atc aat gac agc aac caa agc gaa gta tcc        288
Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val Ser
                 60                  65                  70

aga ttg ttt gaa aga ttt cat ttg gag ggc gag ctc cag agg acg act        336
Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr Thr
             75                  80                  85

gga aat tca atc cat caa gca caa gac ggt aca acc act aca gct cct        384
Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala Pro
         90                  95                  100

tat ggt gac tcc ttg ctg agc gag gag gtt gca agt gca ctt gcg gaa        432
Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala Glu
105                  110                  115                  120

ctc ctc ccc gta tgg tct cag ctg atc gaa gag cat agc ctt caa gac        480
Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln Asp
                     125                  130                  135

ctc aag gcg agc cct cag gcg aag cgg ctc gac agt gtg agc ttc gcg        528
Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe Ala
                 140                  145                  150

cac tac tgt gag aag gaa cta aac ttg cct gct gtt ctc ggc gta gca        576
His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val Ala
             155                  160                  165

aac cag atc aca cgc gct ctg ctc ggt gtg gaa gcc cac gag atc agc        624
Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile Ser
         170                  175                  180

atg ctt ttt ctc acc gac tac atc aag agt gcc acc ggt ctc agt aat        672
Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser Asn
185                  190                  195                  200

att ttc tcg gac aag aaa gac ggc ggg cag tat atg cga tgc aaa aca        720
Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys Thr
                     205                  210                  215

ggt atg cag tcg att tgc cat gcc atg tca aag gaa ctt gtt cca ggc        768
Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro Gly
                 220                  225                  230

tca gtg cac ctc aac acc ccc gtc gct gaa att gag cag tcg gca tcc        816
Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala Ser
             235                  240                  245

ggc tgt aca gta cga tcg gcc tcg ggc gcc gtg ttc cga agc aaa aag        864
Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys Lys
         250                  255                  260
```

```
gtg gtg gtt tcg tta ccg aca acc ttg tat ccc acc ttg aca ttt tca        912
Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe Ser
265             270             275             280

cca cct ctt ccc gcc gag aag caa gca ttg gcg gaa aat tct atc ctg        960
Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile Leu
                285             290             295

ggc tac tat agc aag ata gtc ttc gta tgg gac aag ccg tgg tgg cgc       1008
Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp Arg
                300             305             310

gaa caa ggc ttc tcg ggc gtc ctc caa tcg agc tgt gac ccc atc tca       1056
Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile Ser
            315             320             325

ttt gcc aga gat acc agc atc gac gtc gat cga caa tgg tcc att acc       1104
Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile Thr
            330             335             340

tgt ttc atg gtc gga gac ccg gga cgg aag tgg tcc caa cag tcc aag       1152
Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser Lys
345             350             355             360

cag gta cga caa aag tct gtc tgg gac caa ctc cgc gca gcc tac gag       1200
Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr Glu
                365             370             375

aac gcc ggg gcc caa gtc cca gag ccg gcc aac gtg ctc gaa atc gag       1248
Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile Glu
                380             385             390

tgg tcg aag cag cag tat ttc caa gga gct ccg agc gcc gtc tat ggg       1296
Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr Gly
            395             400             405

ctg aac gat ctc atc aca ctg ggt tcg gcg ctc aga acg ccg ttc aag       1344
Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe Lys
            410             415             420

agt gtt cat ttc gtt gga acg gag acg tct tta gtt tgg aaa ggg tat       1392
Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly Tyr
425             430             435             440

atg gaa ggg gcc ata cga tcg ggt caa cga ggt gct gca gaa gtt gtg       1440
Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val Val
            445             450             455

gct agc ctg gtg cca gca gca tag                                       1464
Ala Ser Leu Val Pro Ala Ala
            460
```

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        <210> 21
        <211> 487
        <212> PRT
        <213> Unknown

        <220>
        <221> SIGNAL
        <222> (1)...(24)
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<223> K:trAPAO translational fusion with barley alpha
amylase signal sequence, for expression and
secretion of the mature trAPAO in maize.

<400> 21

```
Met Ala Asn Lys His Leu Ser Leu Ser Leu Phe Leu Val Leu Leu Gly
            -20                 -15                 -10
Leu Ser Ala Ser Leu Ala Ser Gly Lys Asp Asn Val Ala Asp Val Val
            -5                  1                   5
Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val Gln
        10                  15                  20
Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val Gly
25                  30                  35                  40
Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile Asn
                45                  50                  55
Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val Ser
            60                  65                  70
Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr Thr
        75                  80                  85
Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala Pro
        90                  95                  100
Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala Glu
105                 110                 115                 120
Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln Asp
            125                 130                 135
Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe Ala
            140                 145                 150
His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val Ala
        155                 160                 165
Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile Ser
        170                 175                 180
Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser Asn
185                 190                 195                 200
Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys Thr
            205                 210                 215
Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro Gly
        220                 225                 230
Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala Ser
        235                 240                 245
Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys Lys
250                 255                 260
Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe Ser
265                 270                 275                 280
Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile Leu
            285                 290                 295
Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp Arg
            300                 305                 310
Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile Ser
        315                 320                 325
Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile Thr
        330                 335                 340
Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser Lys
345                 350                 355                 360
Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr Glu
            365                 370                 375
Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile Glu
        380                 385                 390
Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr Gly
        395                 400                 405
Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe Lys
410                 415                 420
Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly Tyr
```

```
425                       430                     435                     440
Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val Val
                    445                     450                     455
Ala Ser Leu Val Pro Ala Ala
                460
```

```
        <210> 22
        <211> 1803
        <212> DNA
        <213> Exophiala spinifera

        <220>
        <221> CDS
        <222> (1)...(1800)

        <400> 22
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```
atg gca ctt gca ccg agc tac atc aat ccc cca aac gtc gcc tcc cca        48
Met Ala Leu Ala Pro Ser Tyr Ile Asn Pro Pro Asn Val Ala Ser Pro
1               5                   10                  15

gca ggg tat tct cac gtc ggc gta ggc cca gac gga ggg agg tat gtg        96
Ala Gly Tyr Ser His Val Gly Val Gly Pro Asp Gly Gly Arg Tyr Val
                20                  25                  30

aca ata gct gga cag att gga caa gac gct tcg ggc gtg aca gac cct       144
Thr Ile Ala Gly Gln Ile Gly Gln Asp Ala Ser Gly Val Thr Asp Pro
            35                  40                  45

gcc tac gag aaa cag gtt gcc caa gca ttc gcc aat ctg cga gct tgc       192
Ala Tyr Glu Lys Gln Val Ala Gln Ala Phe Ala Asn Leu Arg Ala Cys
        50                  55                  60

ctt gct gca gtt gga gcc act tca aac gac gtc acc aag ctc aat tac       240
Leu Ala Ala Val Gly Ala Thr Ser Asn Asp Val Thr Lys Leu Asn Tyr
65                  70                  75                  80

tac atc gtc gac tac gcc ccg agc aaa ctc acc gca att gga gat ggg       288
Tyr Ile Val Asp Tyr Ala Pro Ser Lys Leu Thr Ala Ile Gly Asp Gly
                85                  90                  95

ctg aag gct acc ttt gcc ctt gac agg ctc cct cct tgc acg ctg gtg       336
Leu Lys Ala Thr Phe Ala Leu Asp Arg Leu Pro Pro Cys Thr Leu Val
                100                 105                 110

cca gtg tcg gcc ttg tct tca cct gaa tac ctc ttt gag gtt gat gcc       384
Pro Val Ser Ala Leu Ser Ser Pro Glu Tyr Leu Phe Glu Val Asp Ala
            115                 120                 125

acg gcg ctg gtg ccg gga cac acg acc cca gac aac gtt gcg gac gtg       432
Thr Ala Leu Val Pro Gly His Thr Thr Pro Asp Asn Val Ala Asp Val
        130                 135                 140

gta gtg gtg ggc gct ggc ttg agc ggt ttg gag acg gca cgc aaa gtc       480
Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val
145                 150                 155                 160

cag gcc gcc ggt ctg tcc tgc ctc gtt ctt gag gcg atg gat cgt gta       528
Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val
                165                 170                 175

ggg gga aag act ctg agc gta caa tcg ggt ccc ggc agg acg act atc       576
Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile
```

```
                 180                    185                    190
aac gac ctc ggc gct gcg tgg atc aat gac agc aac caa agc gaa gta    624
Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val
        195                    200                    205

tcc aga ttg ttt gaa aga ttt cat ttg gag ggc gag ctc cag agg acg    672
Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr
    210                    215                    220

act gga aat tca atc cat caa gca caa gac ggt aca acc act aca gct    720
Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala
225                    230                    235                    240

cct tat ggt gac tcc ttg ctg agc gag gag gtt gca agt gca ctt gcg    768
Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala
                245                    250                    255

gaa ctc ctc ccc gta tgg tct cag ctg atc gaa gag cat agc ctt caa    816
Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln
                260                    265                    270

gac ctc aag gcg agc cct cag gcg aag cgg ctc gac agt gtg agc ttc    864
Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe
        275                    280                    285

gcg cac tac tgt gag aag gaa cta aac ttg cct gct gtt ctc ggc gta    912
Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val
        290                    295                    300

gca aac cag atc aca cgc gct ctg ctc ggt gtg gaa gcc cac gag atc    960
Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile
305                    310                    315                    320

agc atg ctt ttt ctc acc gac tac atc aag agt gcc acc ggt ctc agt   1008
Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser
                325                    330                    335

aat att ttc tcg gac aag aaa gac ggc ggg cag tat atg cga tgc aaa   1056
Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys
                340                    345                    350

aca ggt atg cag tcg att tgc cat gcc atg tca aag gaa ctt gtt cca   1104
Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro
        355                    360                    365

ggc tca gtg cac ctc aac acc ccc gtc gct gaa att gag cag tcg gca   1152
Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala
        370                    375                    380

tcc ggc tgt aca gta cga tcg gcc tcg ggc gcc gtg ttc cga agc aaa   1200
Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys
385                    390                    395                    400

aag gtg gtg gtt tcg tta ccg aca acc ttg tat ccc acc ttg aca ttt   1248
Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe
                405                    410                    415

tca cca cct ctt ccc gcc gag aag caa gca ttg gcg gaa aat tct atc   1296
Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile
                420                    425                    430
```

```
ctg ggc tac tat agc aag ata gtc ttc gta tgg gac aag ccg tgg tgg    1344
Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp
        435                 440                 445

cgc gaa caa ggc ttc tcg ggc gtc ctc caa tcg agc tgt gac ccc atc    1392
Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile
    450                 455                 460

tca ttt gcc aga gat acc agc atc gac gtc gat cga caa tgg tcc att    1440
Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile
465                 470                 475                 480

acc tgt ttc atg gtc gga gac ccg gga cgg aag tgg tcc caa cag tcc    1488
Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser
                485                 490                 495

aag cag gta cga caa aag tct gtc tgg gac caa ctc cgc gca gcc tac    1536
Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr
            500                 505                 510

gag aac gcc ggg gcc caa gtc cca gag ccg gcc aac gtg ctc gaa atc    1584
Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile
        515                 520                 525

gag tgg tcg aag cag cag tat ttc caa gga gct ccg agc gcc gtc tat    1632
Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr
    530                 535                 540

ggg ctg aac gat ctc atc aca ctg ggt tcg gcg ctc aga acg ccg ttc    1680
Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe
545                 550                 555                 560

aag agt gtt cat ttc gtt gga acg gag acg tct tta gtt tgg aaa ggg    1728
Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly
                565                 570                 575

tat atg gaa ggg gcc ata cga tcg ggt caa cga ggt gct gca gaa gtt    1776
Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val
                580                 585                 590

gtg gct agc ctg gtg cca gca gca tag                                1803
Val Ala Ser Leu Val Pro Ala Ala
        595                 600


        <210> 23
        <211> 600
        <212> PRT
        <213> Exophiala spinifera

        <400> 23
Met Ala Leu Ala Pro Ser Tyr Ile Asn Pro Pro Asn Val Ala Ser Pro
1               5                   10                  15
Ala Gly Tyr Ser His Val Gly Val Gly Pro Asp Gly Gly Arg Tyr Val
            20                  25                  30
Thr Ile Ala Gly Gln Ile Gly Gln Asp Ala Ser Gly Val Thr Asp Pro
        35                  40                  45
Ala Tyr Glu Lys Gln Val Ala Gln Ala Phe Ala Asn Leu Arg Ala Cys
    50                  55                  60
Leu Ala Ala Val Gly Ala Thr Ser Asn Asp Val Thr Lys Leu Asn Tyr
65                  70                  75                  80
Tyr Ile Val Asp Tyr Ala Pro Ser Lys Leu Thr Ala Ile Gly Asp Gly
```

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                    85                      90                      95
Leu Lys Ala Thr Phe Ala Leu Asp Arg Leu Pro Pro Cys Thr Leu Val
            100                     105                     110
Pro Val Ser Ala Leu Ser Ser Pro Glu Tyr Leu Phe Glu Val Asp Ala
        115                     120                     125
Thr Ala Leu Val Pro Gly His Thr Thr Pro Asp Asn Val Ala Asp Val
    130                     135                     140
Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val
145                     150                     155                     160
Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val
                165                     170                     175
Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile
            180                     185                     190
Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val
        195                     200                     205
Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr
    210                     215                     220
Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala
225                     230                     235                     240
Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala
                245                     250                     255
Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln
            260                     265                     270
Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe
        275                     280                     285
Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val
    290                     295                     300
Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile
305                     310                     315                     320
Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser
                325                     330                     335
Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys
            340                     345                     350
Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro
        355                     360                     365
Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala
    370                     375                     380
Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys
385                     390                     395                     400
Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe
            405                     410                     415
Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile
        420                     425                     430
Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp
    435                     440                     445
Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile
    450                     455                     460
Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile
465                     470                     475                     480
Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser
                485                     490                     495
Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr
        500                     505                     510
Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile
        515                     520                     525
Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr
        530                     535                     540
Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe
545                     550                     555                     560
Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly
                565                     570                     575
Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val
```

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              580                585                590
Val Ala Ser Leu Val Pro Ala Ala
          595                600
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<210> 24
<211> 3003
<212> DNA
<213> Unknown

<220>
<223> Sequence is a barley alpha amylase signal
      sequence: esp1 mat: an artificial spacer sequence
      and K:trAPAO

<221> sig_peptide
<222> (1)...(72)
<223> Barley alpha amylase signal sequence

<221> misc_feature
<222> (73)...(1575)
<223> esp1 mat

<221> misc_feature
<222> (1576)...(1611)
<223> spacer sequence

<221> misc_feature
<222> (1612)...(3000)
<223> K:trAPAO

<221> CDS
<222> (1)...(3000)

<221> misc_feature
<222> (1612)...(1614)
<223> Extra lysine

<400> 24
atg gcc aac aag cac ctg agc ctc tcc ctc ttc ctc gtg ctc ctc ggc      48
Met Ala Asn Lys His Leu Ser Leu Ser Leu Phe Leu Val Leu Leu Gly
            -20                -15                -10

ctc tcc gcc tcc ctc gcc agc ggc gct cct act gtc aag att gat gct      96
Leu Ser Ala Ser Leu Ala Ser Gly Ala Pro Thr Val Lys Ile Asp Ala
            -5                 1                  5

ggg atg gtg gtc ggc acg act act act gtc ccc ggc acc act gcg acc      144
Gly Met Val Val Gly Thr Thr Thr Thr Val Pro Gly Thr Thr Ala Thr
    10                15                20

gtc agc gag ttc ttg ggc gtt cct ttt gcc gcc tct ccg aca cga ttt      192
Val Ser Glu Phe Leu Gly Val Pro Phe Ala Ala Ser Pro Thr Arg Phe
25                30                35                40

gcg cct cct act cgt ccc gtg cct tgg tca acg cct ttg caa gcc act      240
Ala Pro Pro Thr Arg Pro Val Pro Trp Ser Thr Pro Leu Gln Ala Thr
            45                50                55

gca tat ggt cca gca tgc cct caa caa ttc aat tac ccc gaa gaa ctc      288
Ala Tyr Gly Pro Ala Cys Pro Gln Gln Phe Asn Tyr Pro Glu Glu Leu
            60                65                70
```

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cgt gag att acg atg gcc tgg ttc aat aca ccg ccc ccg tca gct ggt      336
Arg Glu Ile Thr Met Ala Trp Phe Asn Thr Pro Pro Pro Ser Ala Gly
        75                  80                  85

gaa agt gag gac tgc ctg aac ctc aac atc tac gtc cca gga act gag      384
Glu Ser Glu Asp Cys Leu Asn Leu Asn Ile Tyr Val Pro Gly Thr Glu
    90                  95                 100

aac aca aac aaa gcc gtc atg gtt tgg ata tac ggt gga gcg ctg gaa      432
Asn Thr Asn Lys Ala Val Met Val Trp Ile Tyr Gly Gly Ala Leu Glu
105                 110                 115                 120

tat ggt tgg aat tca ttc cac ctt tac gac ggg gct agt ttc gca gcc      480
Tyr Gly Trp Asn Ser Phe His Leu Tyr Asp Gly Ala Ser Phe Ala Ala
                125                 130                 135

aat cag gat gtc atc gcc gtg acc atc aac tac aga acg aac att ctg      528
Asn Gln Asp Val Ile Ala Val Thr Ile Asn Tyr Arg Thr Asn Ile Leu
                140                 145                 150

ggg ttc cct gct gcc cct cag ctt cca ata aca cag cga aat ctg ggg      576
Gly Phe Pro Ala Ala Pro Gln Leu Pro Ile Thr Gln Arg Asn Leu Gly
                155                 160                 165

ttc cta gac caa agg ttt gct ttg gat tgg gta cag cgg aac atc gca      624
Phe Leu Asp Gln Arg Phe Ala Leu Asp Trp Val Gln Arg Asn Ile Ala
        170                 175                 180

gcc ttt ggc ggt gat cct cga aag gtc aca ata ttt ggg cag agt gcg      672
Ala Phe Gly Gly Asp Pro Arg Lys Val Thr Ile Phe Gly Gln Ser Ala
185                 190                 195                 200

ggg ggc aga agt gtc gac gtc ctc ttg acg tct atg cca cac aac cca      720
Gly Gly Arg Ser Val Asp Val Leu Leu Thr Ser Met Pro His Asn Pro
                205                 210                 215

ccc ttc cga gca gca atc atg gag tcc ggt gtg gct aac tac aac ttc      768
Pro Phe Arg Ala Ala Ile Met Glu Ser Gly Val Ala Asn Tyr Asn Phe
                220                 225                 230

ccc aag gga gat ttg tcc gaa cct tgg aac acc act gtt caa gct ctc      816
Pro Lys Gly Asp Leu Ser Glu Pro Trp Asn Thr Thr Val Gln Ala Leu
        235                 240                 245

aac tgt acc acc agt atc gac atc ttg agt tgt atg aga aga gtc gat      864
Asn Cys Thr Thr Ser Ile Asp Ile Leu Ser Cys Met Arg Arg Val Asp
        250                 255                 260

ctc gcc act ctg atg aac acg atc gag caa ctc gga ctt ggg ttt gag      912
Leu Ala Thr Leu Met Asn Thr Ile Glu Gln Leu Gly Leu Gly Phe Glu
265                 270                 275                 280

tac acg ttg gac aac gta acg gct gtg tac cgt tct gaa acg gct cgc      960
Tyr Thr Leu Asp Asn Val Thr Ala Val Tyr Arg Ser Glu Thr Ala Arg
                285                 290                 295

acg act ggt gac att gct cgt gta cct gtt ctc gtc ggg acg gtg gcc     1008
Thr Thr Gly Asp Ile Ala Arg Val Pro Val Leu Val Gly Thr Val Ala
                300                 305                 310

aac gac gga ctt ctc ttt gtc ctc ggg gag aat gac acc caa gca tat     1056
Asn Asp Gly Leu Leu Phe Val Leu Gly Glu Asn Asp Thr Gln Ala Tyr
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                    315                      320                      325

ctc gag gag gca atc ccg aat cag ccc gac ctt tac cag act ctc ctt          1104
Leu Glu Glu Ala Ile Pro Asn Gln Pro Asp Leu Tyr Gln Thr Leu Leu
        330                      335                      340

gga gca tat ccc att gga tcc cca ggg atc gga tcg cct caa gat cag          1152
Gly Ala Tyr Pro Ile Gly Ser Pro Gly Ile Gly Ser Pro Gln Asp Gln
345                      350                      355                      360

att gcc gcc att gag acc gag gta aga ttc cag tgt cct tct gcc atc          1200
Ile Ala Ala Ile Glu Thr Glu Val Arg Phe Gln Cys Pro Ser Ala Ile
                    365                      370                      375

gtg gct cag gac tcc cgg aat cgg ggt atc cct tct tgg cgc tac tac          1248
Val Ala Gln Asp Ser Arg Asn Arg Gly Ile Pro Ser Trp Arg Tyr Tyr
                380                      385                      390

tac aat gcg acc ttt gag aat ctg gag ctt ttc cct ggg tcc gaa gtg          1296
Tyr Asn Ala Thr Phe Glu Asn Leu Glu Leu Phe Pro Gly Ser Glu Val
            395                      400                      405

tac cac agc tct gaa gtc ggg atg gtg ttt ggc acg tat cct gtc gca          1344
Tyr His Ser Ser Glu Val Gly Met Val Phe Gly Thr Tyr Pro Val Ala
        410                      415                      420

agt gcg acc gcc ttg gag gcc cag acg agc aaa tac atg cag ggt gcc          1392
Ser Ala Thr Ala Leu Glu Ala Gln Thr Ser Lys Tyr Met Gln Gly Ala
425                      430                      435                      440

tgg gcg gcc ttt gcc aaa aac ccc atg aat ggg cct ggg tgg aaa caa          1440
Trp Ala Ala Phe Ala Lys Asn Pro Met Asn Gly Pro Gly Trp Lys Gln
                    445                      450                      455

gtg ccg aat gtc gcg gcg ctt ggc tca cca ggc aaa gcc atc cag gtt          1488
Val Pro Asn Val Ala Ala Leu Gly Ser Pro Gly Lys Ala Ile Gln Val
                460                      465                      470

gac gtc tct cca gcg aca ata gac caa cga tgt gcc ttg tac acg cgt          1536
Asp Val Ser Pro Ala Thr Ile Asp Gln Arg Cys Ala Leu Tyr Thr Arg
            475                      480                      485

tat tat act gag ttg ggc aca atc gcg ccg agg aca ttt ggc gga ggc          1584
Tyr Tyr Thr Glu Leu Gly Thr Ile Ala Pro Arg Thr Phe Gly Gly Gly
            490                      495                      500

agc ggc gga ggc agc ggc gga ggc agc aaa gac aac gtt gcg gac gtg          1632
Ser Gly Gly Gly Ser Gly Gly Gly Ser Lys Asp Asn Val Ala Asp Val
505                      510                      515                      520

gta gtg gtg ggc gct ggc ttg agc ggt ttg gag acg gca cgc aaa gtc          1680
Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val
                525                      530                      535

cag gcc gcc ggt ctg tcc tgc ctc gtt ctt gag gcg atg gat cgt gta          1728
Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val
                540                      545                      550

ggg gga aag act ctg agc gta caa tcg ggt ccc ggc agg acg act atc          1776
Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile
            555                      560                      565
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aac gac ctc ggc gct gcg tgg atc aat gac agc aac caa agc gaa gta      1824
Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val
    570                 575                 580

tcc aga ttg ttt gaa aga ttt cat ttg gag ggc gag ctc cag agg acg      1872
Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr
585                 590                 595                 600

act gga aat tca atc cat caa gca caa gac ggt aca acc act aca gct      1920
Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala
                605                 610                 615

cct tat ggt gac tcc ttg ctg agc gag gag gtt gca agt gca ctt gcg      1968
Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala
                620                 625                 630

gaa ctc ctc ccc gta tgg tct cag ctg atc gaa gag cat agc ctt caa      2016
Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln
            635                 640                 645

gac ctc aag gcg agc cct cag gcg aag cgg ctc gac agt gtg agc ttc      2064
Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe
    650                 655                 660

gcg cac tac tgt gag aag gaa cta aac ttg cct gct gtt ctc ggc gta      2112
Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val
665                 670                 675                 680

gca aac cag atc aca cgc gct ctg ctc ggt gtg gaa gcc cac gag atc      2160
Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile
                685                 690                 695

agc atg ctt ttt ctc acc gac tac atc aag agt gcc acc ggt ctc agt      2208
Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser
            700                 705                 710

aat att ttc tcg gac aag aaa gac ggc ggg cag tat atg cga tgc aaa      2256
Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys
            715                 720                 725

aca ggt atg cag tcg att tgc cat gcc atg tca aag gaa ctt gtt cca      2304
Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro
    730                 735                 740

ggc tca gtg cac ctc aac acc ccc gtc gct gaa att gag cag tcg gca      2352
Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala
745                 750                 755                 760

tcc ggc tgt aca gta cga tcg gcc tcg ggc gcc gtg ttc cga agc aaa      2400
Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys
                765                 770                 775

aag gtg gtg gtt tcg tta ccg aca acc ttg tat ccc acc ttg aca ttt      2448
Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe
                780                 785                 790

tca cca cct ctt ccc gcc gag aag caa gca ttg gcg gaa aat tct atc      2496
Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile
                795                 800                 805

ctg ggc tac tat agc aag ata gtc ttc gta tgg gac aag ccg tgg tgg      2544
Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp
```

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          810                   815                   820
cgc gaa caa ggc ttc tcg ggc gtc ctc caa tcg agc tgt gac ccc atc      2592
Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile
825                   830                   835                   840

tca ttt gcc aga gat acc agc atc gac gtc gat cga caa tgg tcc att      2640
Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile
                  845                   850                   855

acc tgt ttc atg gtc gga gac ccg gga cgg aag tgg tcc caa cag tcc      2688
Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser
                  860                   865                   870

aag cag gta cga caa aag tct gtc tgg gac caa ctc cgc gca gcc tac      2736
Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr
                  875                   880                   885

gag aac gcc ggg gcc caa gtc cca gag ccg gcc aac gtg ctc gaa atc      2784
Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile
                  890                   895                   900

gag tgg tcg aag cag cag tat ttc caa gga gct ccg agc gcc gtc tat      2832
Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr
905                   910                   915                   920

ggg ctg aac gat ctc atc aca ctg ggt tcg gcg ctc aga acg ccg ttc      2880
Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe
                  925                   930                   935

aag agt gtt cat ttc gtt gga acg gag acg tct tta gtt tgg aaa ggg      2928
Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly
                  940                   945                   950

tat atg gaa ggg gcc ata cga tcg ggt caa cga ggt gct gca gaa gtt      2976
Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val
                  955                   960                   965

gtg gct agc ctg gtg cca gca gca tag                                  3003
Val Ala Ser Leu Val Pro Ala Ala
    970                   975


        <210> 25
        <211> 1000
        <212> PRT
        <213> Unknown

        <220>
        <221> SIGNAL
        <222> (1)...(24)

        <400> 25
Met Ala Asn Lys His Leu Ser Leu Ser Leu Phe Leu Val Leu Leu Gly
              -20                   -15                   -10
Leu Ser Ala Ser Leu Ala Ser Gly Ala Pro Thr Val Lys Ile Asp Ala
              -5                    1                     5
Gly Met Val Val Gly Thr Thr Thr Thr Val Pro Gly Thr Thr Ala Thr
    10                    15                    20
Val Ser Glu Phe Leu Gly Val Pro Phe Ala Ala Ser Pro Thr Arg Phe
25                    30                    35                    40
Ala Pro Pro Thr Arg Pro Val Pro Trp Ser Thr Pro Leu Gln Ala Thr
```

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                      45                    50                    55
Ala Tyr Gly Pro Ala Cys Pro Gln Gln Phe Asn Tyr Pro Glu Glu Leu
            60                  65                  70
Arg Glu Ile Thr Met Ala Trp Phe Asn Thr Pro Pro Pro Ser Ala Gly
        75                  80                  85
Glu Ser Glu Asp Cys Leu Asn Leu Asn Ile Tyr Val Pro Gly Thr Glu
        90                  95                  100
Asn Thr Asn Lys Ala Val Met Val Trp Ile Tyr Gly Gly Ala Leu Glu
105                 110                 115                 120
Tyr Gly Trp Asn Ser Phe His Leu Tyr Asp Gly Ala Ser Phe Ala Ala
                125                 130                 135
Asn Gln Asp Val Ile Ala Val Thr Ile Asn Tyr Arg Thr Asn Ile Leu
                140                 145                 150
Gly Phe Pro Ala Ala Pro Gln Leu Pro Ile Thr Gln Arg Asn Leu Gly
            155                 160                 165
Phe Leu Asp Gln Arg Phe Ala Leu Asp Trp Val Gln Arg Asn Ile Ala
    170                 175                 180
Ala Phe Gly Gly Asp Pro Arg Lys Val Thr Ile Phe Gly Gln Ser Ala
185                 190                 195                 200
Gly Gly Arg Ser Val Asp Val Leu Leu Thr Ser Met Pro His Asn Pro
                205                 210                 215
Pro Phe Arg Ala Ala Ile Met Glu Ser Gly Val Ala Asn Tyr Asn Phe
            220                 225                 230
Pro Lys Gly Asp Leu Ser Glu Pro Trp Asn Thr Thr Val Gln Ala Leu
            235                 240                 245
Asn Cys Thr Thr Ser Ile Asp Ile Leu Ser Cys Met Arg Arg Val Asp
    250                 255                 260
Leu Ala Thr Leu Met Asn Thr Ile Glu Gln Leu Gly Leu Gly Phe Glu
265                 270                 275                 280
Tyr Thr Leu Asp Asn Val Thr Ala Val Tyr Arg Ser Glu Thr Ala Arg
                285                 290                 295
Thr Thr Gly Asp Ile Ala Arg Val Pro Val Leu Val Gly Thr Val Ala
            300                 305                 310
Asn Asp Gly Leu Leu Phe Val Leu Gly Glu Asn Asp Thr Gln Ala Tyr
            315                 320                 325
Leu Glu Glu Ala Ile Pro Asn Gln Pro Asp Leu Tyr Gln Thr Leu Leu
    330                 335                 340
Gly Ala Tyr Pro Ile Gly Ser Pro Gly Ile Gly Ser Pro Gln Asp Gln
345                 350                 355                 360
Ile Ala Ala Ile Glu Thr Glu Val Arg Phe Gln Cys Pro Ser Ala Ile
            365                 370                 375
Val Ala Gln Asp Ser Arg Asn Arg Gly Ile Pro Ser Trp Arg Tyr Tyr
            380                 385                 390
Tyr Asn Ala Thr Phe Glu Asn Leu Glu Leu Phe Pro Gly Ser Glu Val
            395                 400                 405
Tyr His Ser Ser Glu Val Gly Met Val Phe Gly Thr Tyr Pro Val Ala
    410                 415                 420
Ser Ala Thr Ala Leu Glu Ala Gln Thr Ser Lys Tyr Met Gln Gly Ala
425                 430                 435                 440
Trp Ala Ala Phe Ala Lys Asn Pro Met Asn Gly Pro Gly Trp Lys Gln
            445                 450                 455
Val Pro Asn Val Ala Ala Leu Gly Ser Pro Gly Lys Ala Ile Gln Val
            460                 465                 470
Asp Val Ser Pro Ala Thr Ile Asp Gln Arg Cys Ala Leu Tyr Thr Arg
            475                 480                 485
Tyr Tyr Thr Glu Leu Gly Thr Ile Ala Pro Arg Thr Phe Gly Gly Gly
    490                 495                 500
Ser Gly Gly Gly Ser Gly Gly Gly Ser Lys Asp Asn Val Ala Asp Val
505                 510                 515                 520
Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val
            525                 530                 535
Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val
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                 540                      545                      550
Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile
         555                      560                      565
Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val
         570                      575                      580
Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr
585                      590                      595                      600
Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala
                 605                      610                      615
Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala
                 620                      625                      630
Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln
         635                      640                      645
Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe
         650                      655                      660
Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val
665                      670                      675                      680
Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile
                 685                      690                      695
Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser
                 700                      705                      710
Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys
         715                      720                      725
Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro
         730                      735                      740
Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala
745                      750                      755                      760
Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys
                 765                      770                      775
Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe
                 780                      785                      790
Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile
         795                      800                      805
Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp
         810                      815                      820
Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile
825                      830                      835                      840
Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile
                 845                      850                      855
Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser
                 860                      865                      870
Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr
         875                      880                      885
Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile
         890                      895                      900
Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr
905                      910                      915                      920
Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe
                 925                      930                      935
Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly
                 940                      945                      950
Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val
         955                      960                      965
Val Ala Ser Leu Val Pro Ala Ala
         970                      975

         <210> 26
         <211> 2976
         <212> DNA
         <213> Unknown

         <220>
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<223> Barley alpha amylase signal sequence: BEST1
      mature: artificial spacer: and K:trAPAO. For
      plant expression.

<221> sig_peptide
<222> (1)...(72)
<223> Barley alpha amylase signal sequence.

<221> mat_peptide
<222> (73)...(1545)
<223> BEST1 mature

<221> misc_feature
<222> (1546)...(1584)
<223> Artificial spacer sequence

<221> misc_feature
<222> (1585)...(2973)
<223> K:trAPAO

<221> CDS
<222> (1)...(2973)

<221> misc_feature
<222> (1585)...(1587)
<223> Extra lysine

<400> 26

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atg gcc aac aag cac ctg agc ctc tcc ctc ttc ctc gtg ctc ctc ggc        48
Met Ala Asn Lys His Leu Ser Leu Ser Leu Phe Leu Val Leu Leu Gly
            -20              -15                -10

ctc tcc gcc tcc ctc gcc agc ggc acg gat ttt ccg gtc cgc agg acc        96
Leu Ser Ala Ser Leu Ala Ser Gly Thr Asp Phe Pro Val Arg Arg Thr
            -5               1                5

gat ctg ggc cag gtt cag gga ctg gcc ggg gac gtg atg agc ttt cgc       144
Asp Leu Gly Gln Val Gln Gly Leu Ala Gly Asp Val Met Ser Phe Arg
    10                  15                  20

gga ata ccc tat gca gcg ccg ccg gtg ggc ggg ctg cgt tgg aag ccg       192
Gly Ile Pro Tyr Ala Ala Pro Pro Val Gly Gly Leu Arg Trp Lys Pro
25                  30                  35                  40

ccc caa cac gcc cgg ccc tgg gcg ggc gtt cgc ccc gcc acc caa ttt       240
Pro Gln His Ala Arg Pro Trp Ala Gly Val Arg Pro Ala Thr Gln Phe
                45                  50                  55

ggc tcc gac tgc ttc ggc gcg gcc tat ctt cgc aaa ggc agc ctc gcc       288
Gly Ser Asp Cys Phe Gly Ala Ala Tyr Leu Arg Lys Gly Ser Leu Ala
            60                  65                  70

ccc ggc gtg agc gag gac tgt ctt tac ctc aac gta tgg gcg ccg tca       336
Pro Gly Val Ser Glu Asp Cys Leu Tyr Leu Asn Val Trp Ala Pro Ser
            75                  80                  85

ggc gct aaa ccc ggc cag tac ccc gtc atg gtc tgg gtc tac ggc ggc       384
Gly Ala Lys Pro Gly Gln Tyr Pro Val Met Val Trp Val Tyr Gly Gly
    90                  95                  100

ggc ttc gcc ggc ggc acg gcc gcc atg ccc tac tac gac ggc gag gcg       432
Gly Phe Ala Gly Gly Thr Ala Ala Met Pro Tyr Tyr Asp Gly Glu Ala
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<pre>
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ctt gcg cga cag ggc gtc gtc gtg gtg acg ttt aac tat cgg acg aac   480
Leu Ala Arg Gln Gly Val Val Val Val Thr Phe Asn Tyr Arg Thr Asn
                125   130   135

atc ctg ggc ttt ttc gcc cat cct ggt ctc tcg cgc gag agc ccc acc   528
Ile Leu Gly Phe Phe Ala His Pro Gly Leu Ser Arg Glu Ser Pro Thr
                140   145   150

gga act tcg ggc aac tac ggc cta ctc gac att ctc gcc gct ctt cgg   576
Gly Thr Ser Gly Asn Tyr Gly Leu Leu Asp Ile Leu Ala Ala Leu Arg
                155   160   165

tgg gtg cag agc aac gcc cgc gcc ttc gga ggg gac ccc ggc cga gtg   624
Trp Val Gln Ser Asn Ala Arg Ala Phe Gly Gly Asp Pro Gly Arg Val
                170   175   180

acg gtc ttt ggt gaa tcg gcc gga gcg agc gcg atc gga ctt ctg ctc   672
Thr Val Phe Gly Glu Ser Ala Gly Ala Ser Ala Ile Gly Leu Leu Leu
185   190   195   200

acc tcg ccg ctg agc aag ggt ctc ttc cgt ggc gct atc ctc gaa agt   720
Thr Ser Pro Leu Ser Lys Gly Leu Phe Arg Gly Ala Ile Leu Glu Ser
                205   210   215

cca ggg ctg acg cga ccg ctc gcg acg ctc gcc gac agc gcc gcc tcg   768
Pro Gly Leu Thr Arg Pro Leu Ala Thr Leu Ala Asp Ser Ala Ala Ser
                220   225   230

ggc gag cgc ctc gac gcc gat ctt tcg cga ctg cgc tcg acc gac cca   816
Gly Glu Arg Leu Asp Ala Asp Leu Ser Arg Leu Arg Ser Thr Asp Pro
                235   240   245

gcc acc ctg atg gcg cgc gcc gac gcg gcc cgc ccg gca tcg cgg gac   864
Ala Thr Leu Met Ala Arg Ala Asp Ala Ala Arg Pro Ala Ser Arg Asp
                250   255   260

ctg cgc agg ccg cgt ccg acc gga ccg atc gtc gat ggc cat gtg ctg   912
Leu Arg Arg Pro Arg Pro Thr Gly Pro Ile Val Asp Gly His Val Leu
265   270   275   280

ccg cag acc gac agc gcg gcg atc gcg gcg ggg cag ctg gcg ccg gtt   960
Pro Gln Thr Asp Ser Ala Ala Ile Ala Ala Gly Gln Leu Ala Pro Val
                285   290   295

cgg gtc ctg atc gga acc aat gcc gac gaa ggc cgc gcc ttc ctc ggg   1008
Arg Val Leu Ile Gly Thr Asn Ala Asp Glu Gly Arg Ala Phe Leu Gly
                300   305   310

cgc gcg ccg atg gag acg cca gcg gac tac caa gcc tat ctg gag gcg   1056
Arg Ala Pro Met Glu Thr Pro Ala Asp Tyr Gln Ala Tyr Leu Glu Ala
                315   320   325

cag ttt ggc gac caa gcc gcc gcc gtg gcg gcg tgc tat ccc ctc gac   1104
Gln Phe Gly Asp Gln Ala Ala Ala Val Ala Ala Cys Tyr Pro Leu Asp
                330   335   340

ggc cgg gcc acg ccc aag gaa atg gtc gcg cgc atc ttc ggc gac aat   1152
Gly Arg Ala Thr Pro Lys Glu Met Val Ala Arg Ile Phe Gly Asp Asn
345   350   355   360
</pre>

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cag ttc aat cgg ggg gtc tcg gcc ttc tcg gaa gcg ctt gtg cgc cag        1200
Gln Phe Asn Arg Gly Val Ser Ala Phe Ser Glu Ala Leu Val Arg Gln
            365             370             375

ggc gcg ccc gtg tgg cgt tat cag ttc aac ggt aat acc gag ggt gga        1248
Gly Ala Pro Val Trp Arg Tyr Gln Phe Asn Gly Asn Thr Glu Gly Gly
            380             385             390

aga gcg ccg gct acc cac gga gcc gaa att ccc tac gtt ttc ggg gtg        1296
Arg Ala Pro Ala Thr His Gly Ala Glu Ile Pro Tyr Val Phe Gly Val
            395             400             405

ttc aag ctc gac gag ttg ggt ctg ttc gat tgg ccg ccc gag ggg ccc        1344
Phe Lys Leu Asp Glu Leu Gly Leu Phe Asp Trp Pro Pro Glu Gly Pro
            410             415             420

acg ccc gcc gac cgt gcg ctg ggc caa ctg atg tcc tcc gcc tgg gtc        1392
Thr Pro Ala Asp Arg Ala Leu Gly Gln Leu Met Ser Ser Ala Trp Val
425             430             435             440

cgg ttc gcc aag aat ggc gac ccc gcc ggg gac gcc ctt acc tgg cct        1440
Arg Phe Ala Lys Asn Gly Asp Pro Ala Gly Asp Ala Leu Thr Trp Pro
            445             450             455

gcc tat tct acg ggc aag tcg acc atg aca ttc ggt ccc gag ggc cgc        1488
Ala Tyr Ser Thr Gly Lys Ser Thr Met Thr Phe Gly Pro Glu Gly Arg
            460             465             470

gcg gcg gtg gtg tcg ccc gga cct tcc atc ccc cct tgc gcg gat ggc        1536
Ala Ala Val Val Ser Pro Gly Pro Ser Ile Pro Pro Cys Ala Asp Gly
            475             480             485

gcc aag gcg ggg ggc gga ggc agc ggc gga ggc agc ggc gga ggc agc        1584
Ala Lys Ala Gly Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Gly Ser
            490             495             500

aaa gac aac gtt gcg gac gtg gta gtg gtg ggc gct ggc ttg agc ggt        1632
Lys Asp Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly
505             510             515             520

ttg gag acg gca cgc aaa gtc cag gcc gcc ggt ctg tcc tgc ctc gtt        1680
Leu Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val
            525             530             535

ctt gag gcg atg gat cgt gta ggg gga aag act ctg agc gta caa tcg        1728
Leu Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser
            540             545             550

ggt ccc ggc agg acg act atc aac gac ctc ggc gct gcg tgg atc aat        1776
Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn
            555             560             565

gac agc aac caa agc gaa gta tcc aga ttg ttt gaa aga ttt cat ttg        1824
Asp Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu
            570             575             580

gag ggc gag ctc cag agg acg act gga aat tca atc cat caa gca caa        1872
Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln
585             590             595             600

gac ggt aca acc act aca gct cct tat ggt gac tcc ttg ctg agc gag        1920
Asp Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu
```

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                  605                    610                    615

gag gtt gca agt gca ctt gcg gaa ctc ctc ccc gta tgg tct cag ctg      1968
Glu Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu
            620                 625                 630

atc gaa gag cat agc ctt caa gac ctc aag gcg agc cct cag gcg aag      2016
Ile Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys
            635                 640                 645

cgg ctc gac agt gtg agc ttc gcg cac tac tgt gag aag gaa cta aac      2064
Arg Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn
            650                 655                 660

ttg cct gct gtt ctc ggc gta gca aac cag atc aca cgc gct ctg ctc      2112
Leu Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu
665                 670                 675                 680

ggt gtg gaa gcc cac gag atc agc atg ctt ttt ctc acc gac tac atc      2160
Gly Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile
                    685                 690                 695

aag agt gcc acc ggt ctc agt aat att ttc tcg gac aag aaa gac ggc      2208
Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly
            700                 705                 710

ggg cag tat atg cga tgc aaa aca ggt atg cag tcg att tgc cat gcc      2256
Gly Gln Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala
            715                 720                 725

atg tca aag gaa ctt gtt cca ggc tca gtg cac ctc aac acc ccc gtc      2304
Met Ser Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val
            730                 735                 740

gct gaa att gag cag tcg gca tcc ggc tgt aca gta cga tcg gcc tcg      2352
Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser
745                 750                 755                 760

ggc gcc gtg ttc cga agc aaa aag gtg gtg gtt tcg tta ccg aca acc      2400
Gly Ala Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr
                    765                 770                 775

ttg tat ccc acc ttg aca ttt tca cca cct ctt ccc gcc gag aag caa      2448
Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln
                    780                 785                 790

gca ttg gcg gaa aat tct atc ctg ggc tac tat agc aag ata gtc ttc      2496
Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe
            795                 800                 805

gta tgg gac aag ccg tgg tgg cgc gaa caa ggc ttc tcg ggc gtc ctc      2544
Val Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu
            810                 815                 820

caa tcg agc tgt gac ccc atc tca ttt gcc aga gat acc agc atc gac      2592
Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp
825                 830                 835                 840

gtc gat cga caa tgg tcc att acc tgt ttc atg gtc gga gac ccg gga      2640
Val Asp Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly
            845                 850                 855
```

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cgg aag tgg tcc caa cag tcc aag cag gta cga caa aag tct gtc tgg    2688
Arg Lys Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp
            860             865             870

gac caa ctc cgc gca gcc tac gag aac gcc ggg gcc caa gtc cca gag    2736
Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu
            875             880             885

ccg gcc aac gtg ctc gaa atc gag tgg tcg aag cag cag tat ttc caa    2784
Pro Ala Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln
            890             895             900

gga gct ccg agc gcc gtc tat ggg ctg aac gat ctc atc aca ctg ggt    2832
Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly
905             910             915             920

tcg gcg ctc aga acg ccg ttc aag agt gtt cat ttc gtt gga acg gag    2880
Ser Ala Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu
            925             930             935

acg tct tta gtt tgg aaa ggg tat atg gaa ggg gcc ata cga tcg ggt    2928
Thr Ser Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly
            940             945             950

caa cga ggt gct gca gaa gtt gtg gct agc ctg gtg cca gca gca        2973
Gln Arg Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
            955             960             965

tag                                                                2976
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<212> PRT
<213> Unknown

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<221> SIGNAL
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Leu Ser Ala Ser Leu Ala Ser Gly Thr Asp Phe Pro Val Arg Arg Thr
            -5              1               5
Asp Leu Gly Gln Val Gln Gly Leu Ala Gly Asp Val Met Ser Phe Arg
    10              15              20
Gly Ile Pro Tyr Ala Ala Pro Pro Val Gly Gly Leu Arg Trp Lys Pro
25              30              35              40
Pro Gln His Ala Arg Pro Trp Ala Gly Val Arg Pro Ala Thr Gln Phe
            45              50              55
Gly Ser Asp Cys Phe Gly Ala Ala Tyr Leu Arg Lys Gly Ser Leu Ala
            60              65              70
Pro Gly Val Ser Glu Asp Cys Leu Tyr Leu Asn Val Trp Ala Pro Ser
            75              80              85
Gly Ala Lys Pro Gly Gln Tyr Pro Val Met Val Trp Val Tyr Gly Gly
            90              95              100
Gly Phe Ala Gly Gly Thr Ala Ala Met Pro Tyr Tyr Asp Gly Glu Ala
105             110             115             120
Leu Ala Arg Gln Gly Val Val Val Val Thr Phe Asn Tyr Arg Thr Asn
            125             130             135
Ile Leu Gly Phe Phe Ala His Pro Gly Leu Ser Arg Glu Ser Pro Thr
            140             145             150
```

```
Gly Thr Ser Gly Asn Tyr Gly Leu Leu Asp Ile Leu Ala Ala Leu Arg
        155                 160                 165
Trp Val Gln Ser Asn Ala Arg Ala Phe Gly Gly Asp Pro Gly Arg Val
    170                 175                 180
Thr Val Phe Gly Glu Ser Ala Gly Ala Ser Ala Ile Gly Leu Leu Leu
185                 190                 195                     200
Thr Ser Pro Leu Ser Lys Gly Leu Phe Arg Gly Ala Ile Leu Glu Ser
            205                 210                 215
Pro Gly Leu Thr Arg Pro Leu Ala Thr Leu Ala Asp Ser Ala Ala Ser
            220                 225                 230
Gly Glu Arg Leu Asp Ala Asp Leu Ser Arg Leu Arg Ser Thr Asp Pro
        235                 240                 245
Ala Thr Leu Met Ala Arg Ala Asp Ala Ala Arg Pro Ala Ser Arg Asp
    250                 255                 260
Leu Arg Arg Pro Arg Pro Thr Gly Pro Ile Val Asp Gly His Val Leu
265                 270                 275                     280
Pro Gln Thr Asp Ser Ala Ala Ile Ala Ala Gly Gln Leu Ala Pro Val
            285                 290                 295
Arg Val Leu Ile Gly Thr Asn Ala Asp Glu Gly Arg Ala Phe Leu Gly
            300                 305                 310
Arg Ala Pro Met Glu Thr Pro Ala Asp Tyr Gln Ala Tyr Leu Glu Ala
        315                 320                 325
Gln Phe Gly Asp Gln Ala Ala Ala Val Ala Ala Cys Tyr Pro Leu Asp
    330                 335                 340
Gly Arg Ala Thr Pro Lys Glu Met Val Ala Arg Ile Phe Gly Asp Asn
345                 350                 355                     360
Gln Phe Asn Arg Gly Val Ser Ala Phe Ser Glu Ala Leu Val Arg Gln
            365                 370                 375
Gly Ala Pro Val Trp Arg Tyr Gln Phe Asn Gly Asn Thr Glu Gly Gly
            380                 385                 390
Arg Ala Pro Ala Thr His Gly Ala Glu Ile Pro Tyr Val Phe Gly Val
        395                 400                 405
Phe Lys Leu Asp Glu Leu Gly Leu Phe Asp Trp Pro Pro Glu Gly Pro
    410                 415                 420
Thr Pro Ala Asp Arg Ala Leu Gly Gln Leu Met Ser Ser Ala Trp Val
425                 430                 435                     440
Arg Phe Ala Lys Asn Gly Asp Pro Ala Gly Asp Ala Leu Thr Trp Pro
            445                 450                 455
Ala Tyr Ser Thr Gly Lys Ser Thr Met Thr Phe Gly Pro Glu Gly Arg
            460                 465                 470
Ala Ala Val Val Ser Pro Gly Pro Ser Ile Pro Pro Cys Ala Asp Gly
            475                 480                 485
Ala Lys Ala Gly Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Gly Ser
    490                 495                 500
Lys Asp Asn Val Ala Asp Val Val Val Gly Ala Gly Leu Ser Gly
505                 510                 515                     520
Leu Glu Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val
            525                 530                 535
Leu Glu Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser
            540                 545                 550
Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn
        555                 560                 565
Asp Ser Asn Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu
    570                 575                 580
Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln
585                 590                 595                     600
Asp Gly Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu
            605                 610                 615
Glu Val Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu
            620                 625                 630
Ile Glu Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys
        635                 640                 645
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Arg Leu Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn
    650             655             660
Leu Pro Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu
665             670             675             680
Gly Val Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile
            685             690             695
Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly
            700             705             710
Gly Gln Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala
    715             720             725
Met Ser Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val
    730             735             740
Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser
745             750             755             760
Gly Ala Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr
            765             770             775
Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln
            780             785             790
Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe
    795             800             805
Val Trp Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu
    810             815             820
Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp
825             830             835             840
Val Asp Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly
            845             850             855
Arg Lys Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp
            860             865             870
Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu
    875             880             885
Pro Ala Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln
    890             895             900
Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly
905             910             915             920
Ser Ala Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu
            925             930             935
Thr Ser Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly
            940             945             950
Gln Arg Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
    955             960             965
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<210> 28
<211> 3618
<212> DNA
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<220>
<223> gst:espl:sp:K:trapao, 3618. 1-687, gst +
      polylinker; 688-2190, espl mat; 2191-2226 spacer;
      2227-3615, K:trAPAO, extra lysine; 3616-3618, stop
      codon. For bacterial expression.

<221> CDS
<222> (1)...(3615)

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<222> (1)...(687)
<223> gast + polylinker

<221> mat_peptide
<222> (688)...(2190)
<223> espl mat

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<221> misc_feature
<222> (2191)...(2226)
<223> spacer sequence

<221> misc_feature
<222> (2227)...(3615)
<223> K:trAPAO

<221> misc_feature
<222> (2227)...(2229)
<223> Extra lysine


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atg tcc cct ata cta ggt tat tgg aaa att aag ggc ctt gtg caa ccc        48
Met Ser Pro Ile Leu Gly Tyr Trp Lys Ile Lys Gly Leu Val Gln Pro
1               5                   10                  15

act cga ctt ctt ttg gaa tat ctt gaa gaa aaa tat gaa gag cat ttg        96
Thr Arg Leu Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu
                20                  25                  30

tat gag cgc gat gaa ggt gat aaa tgg cga aac aaa aag ttt gaa ttg       144
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
            35                  40                  45

ggt ttg gag ttt ccc aat ctt cct tat tat att gat ggt gat gtt aaa       192
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys
        50                  55                  60

tta aca cag tct atg gcc atc ata cgt tat ata gct gac aag cac aac       240
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65                  70                  75                  80

atg ttg ggt ggt tgt cca aaa gag cgt gca gag att tca atg ctt gaa       288
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
                85                  90                  95

gga gcg gtt ttg gat att aga tac ggt gtt tcg aga att gca tat agt       336
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
            100                 105                 110

aaa gac ttt gaa act ctc aaa gtt gat ttt ctt agc aag cta cct gaa       384
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
            115                 120                 125

atg ctg aaa atg ttc gaa gat cgt tta tgt cat aaa aca tat tta aat       432
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
        130                 135                 140

ggt gat cat gta acc cat cct gac ttc atg ttg tat gac gct ctt gat       480
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
145                 150                 155                 160

gtt gtt tta tac atg gac cca atg tgc ctg gat gcg ttc cca aaa tta       528
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
                165                 170                 175

gtt tgt ttt aaa aaa cgt att gaa gct atc cca caa att gat aag tac       576
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
            180                 185                 190
```

```
ttg aaa tcc agc aag tat ata gca tgg cct ttg cag ggc tgg caa gcc     624
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
        195                 200                 205

acg ttt ggt ggt ggc gac cat cct cca aaa tcg gat ctg gtt ccg cgt     672
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
    210                 215                 220

gga tcc ccg gaa ttc gct cct act gtc aag att gat gct ggg atg gtg     720
Gly Ser Pro Glu Phe Ala Pro Thr Val Lys Ile Asp Ala Gly Met Val
225                 230                 235                 240

gtc ggc acg act act act gtc ccc ggc acc act gcg acc gtc agc gag     768
Val Gly Thr Thr Thr Thr Val Pro Gly Thr Thr Ala Thr Val Ser Glu
                    245                 250                 255

ttc ttg ggc gtt cct ttt gcc gcc tct ccg aca cga ttt gcg cct cct     816
Phe Leu Gly Val Pro Phe Ala Ala Ser Pro Thr Arg Phe Ala Pro Pro
                260                 265                 270

act cgt ccc gtg cct tgg tca acg cct ttg caa gcc act gca tat ggt     864
Thr Arg Pro Val Pro Trp Ser Thr Pro Leu Gln Ala Thr Ala Tyr Gly
            275                 280                 285

cca gca tgc cct caa caa ttc aat tac ccc gaa gaa ctc cgt gag att     912
Pro Ala Cys Pro Gln Gln Phe Asn Tyr Pro Glu Glu Leu Arg Glu Ile
    290                 295                 300

acg atg gcc tgg ttc aat aca ccg ccc ccg tca gct ggt gaa agt gag     960
Thr Met Ala Trp Phe Asn Thr Pro Pro Pro Ser Ala Gly Glu Ser Glu
305                 310                 315                 320

gac tgc ctg aac ctc aac atc tac gtc cca gga act gag aac aca aac    1008
Asp Cys Leu Asn Leu Asn Ile Tyr Val Pro Gly Thr Glu Asn Thr Asn
                325                 330                 335

aaa gcc gtc atg gtt tgg ata tac ggt gga gcg ctg gaa tat ggt tgg    1056
Lys Ala Val Met Val Trp Ile Tyr Gly Gly Ala Leu Glu Tyr Gly Trp
                340                 345                 350

aat tca ttc cac ctt tac gac ggg gct agt ttc gca gcc aat cag gat    1104
Asn Ser Phe His Leu Tyr Asp Gly Ala Ser Phe Ala Ala Asn Gln Asp
            355                 360                 365

gtc atc gcc gtg acc atc aac tac aga acg aac att ctg ggg ttc cct    1152
Val Ile Ala Val Thr Ile Asn Tyr Arg Thr Asn Ile Leu Gly Phe Pro
    370                 375                 380

gct gcc cct cag ctt cca ata aca cag cga aat ctg ggg ttc cta gac    1200
Ala Ala Pro Gln Leu Pro Ile Thr Gln Arg Asn Leu Gly Phe Leu Asp
385                 390                 395                 400

caa agg ttt gct ttg gat tgg gta cag cgg aac atc gca gcc ttt ggc    1248
Gln Arg Phe Ala Leu Asp Trp Val Gln Arg Asn Ile Ala Ala Phe Gly
                405                 410                 415

ggt gat cct cga aag gtc aca ata ttt ggg cag agt gcg ggg ggc aga    1296
Gly Asp Pro Arg Lys Val Thr Ile Phe Gly Gln Ser Ala Gly Gly Arg
            420                 425                 430

agt gtc gac gtc ctc ttg acg tct atg cca cac aac cca ccc ttc cga    1344
Ser Val Asp Val Leu Leu Thr Ser Met Pro His Asn Pro Pro Phe Arg
```

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                435                  440                    445

gca gca atc atg gag tcc ggt gtg gct aac tac aac ttc ccc aag gga    1392
Ala Ala Ile Met Glu Ser Gly Val Ala Asn Tyr Asn Phe Pro Lys Gly
    450                  455                  460

gat ttg tcc gaa cct tgg aac acc act gtt caa gct ctc aac tgt acc    1440
Asp Leu Ser Glu Pro Trp Asn Thr Thr Val Gln Ala Leu Asn Cys Thr
465                  470                  475                  480

acc agt atc gac atc ttg agt tgt atg aga aga gtc gat ctc gcc act    1488
Thr Ser Ile Asp Ile Leu Ser Cys Met Arg Arg Val Asp Leu Ala Thr
                485                  490                  495

ctg atg aac acg atc gag caa ctc gga ctt ggg ttt gag tac acg ttg    1536
Leu Met Asn Thr Ile Glu Gln Leu Gly Leu Gly Phe Glu Tyr Thr Leu
                500                  505                  510

gac aac gta acg gct gtg tac cgt tct gaa acg gct cgc acg act ggt    1584
Asp Asn Val Thr Ala Val Tyr Arg Ser Glu Thr Ala Arg Thr Thr Gly
            515                  520                  525

gac att gct cgt gta cct gtt ctc gtc ggg acg gtg gcc aac gac gga    1632
Asp Ile Ala Arg Val Pro Val Leu Val Gly Thr Val Ala Asn Asp Gly
        530                  535                  540

ctt ctc ttt gtc ctc ggg gag aat gac acc caa gca tat ctc gag gag    1680
Leu Leu Phe Val Leu Gly Glu Asn Asp Thr Gln Ala Tyr Leu Glu Glu
545                  550                  555                  560

gca atc ccg aat cag ccc gac ctt tac cag act ctc ctt gga gca tat    1728
Ala Ile Pro Asn Gln Pro Asp Leu Tyr Gln Thr Leu Leu Gly Ala Tyr
                565                  570                  575

ccc att gga tcc cca ggg atc gga tcg cct caa gat cag att gcc gcc    1776
Pro Ile Gly Ser Pro Gly Ile Gly Ser Pro Gln Asp Gln Ile Ala Ala
                580                  585                  590

att gag acc gag gta aga ttc cag tgt cct tct gcc atc gtg gct cag    1824
Ile Glu Thr Glu Val Arg Phe Gln Cys Pro Ser Ala Ile Val Ala Gln
                595                  600                  605

gac tcc cgg aat cgg ggt atc cct tct tgg cgc tac tac tac aat gcg    1872
Asp Ser Arg Asn Arg Gly Ile Pro Ser Trp Arg Tyr Tyr Tyr Asn Ala
    610                  615                  620

acc ttt gag aat ctg gag ctt ttc cct ggg tcc gaa gtg tac cac agc    1920
Thr Phe Glu Asn Leu Glu Leu Phe Pro Gly Ser Glu Val Tyr His Ser
625                  630                  635                  640

tct gaa gtc ggg atg gtg ttt ggc acg tat cct gtc gca agt gcg acc    1968
Ser Glu Val Gly Met Val Phe Gly Thr Tyr Pro Val Ala Ser Ala Thr
                645                  650                  655

gcc ttg gag gcc cag acg agc aaa tac atg cag ggt gcc tgg gcg gcc    2016
Ala Leu Glu Ala Gln Thr Ser Lys Tyr Met Gln Gly Ala Trp Ala Ala
                660                  665                  670

ttt gcc aaa aac ccc atg aat ggg cct ggg tgg aaa caa gtg ccg aat    2064
Phe Ala Lys Asn Pro Met Asn Gly Pro Gly Trp Lys Gln Val Pro Asn
                675                  680                  685
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gtc gcg gcg ctt ggc tca cca ggc aaa gcc atc cag gtt gac gtc tct        2112
Val Ala Ala Leu Gly Ser Pro Gly Lys Ala Ile Gln Val Asp Val Ser
    690                 695                 700

cca gcg aca ata gac caa cga tgt gcc ttg tac acg cgt tat tat act        2160
Pro Ala Thr Ile Asp Gln Arg Cys Ala Leu Tyr Thr Arg Tyr Tyr Thr
705                 710                 715                 720

gag ttg ggc aca atc gcg ccg agg aca ttt ggc gga ggc agc ggc gga       2208
Glu Leu Gly Thr Ile Ala Pro Arg Thr Phe Gly Gly Gly Ser Gly Gly
                725                 730                 735

ggc agc ggc gga ggc agc aaa gac aac gtt gcg gac gtg gta gtg gtg       2256
Gly Ser Gly Gly Gly Ser Lys Asp Asn Val Ala Asp Val Val Val Val
            740                 745                 750

ggc gct ggc ttg agc ggt ttg gag acg gca cgc aaa gtc cag gcc gcc       2304
Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val Gln Ala Ala
        755                 760                 765

ggt ctg tcc tgc ctc gtt ctt gag gcg atg gat cgt gta ggg gga aag       2352
Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val Gly Gly Lys
    770                 775                 780

act ctg agc gta caa tcg ggt ccc ggc agg acg act atc aac gac ctc       2400
Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu
785                 790                 795                 800

ggc gct gcg tgg atc aat gac agc aac caa agc gaa gta tcc aga ttg       2448
Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val Ser Arg Leu
                805                 810                 815

ttt gaa aga ttt cat ttg gag ggc gag ctc cag agg acg act gga aat       2496
Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn
                820                 825                 830

tca atc cat caa gca caa gac ggt aca acc act aca gct cct tat ggt       2544
Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Thr Ala Pro Tyr Gly
            835                 840                 845

gac tcc ttg ctg agc gag gag gtt gca agt gca ctt gcg gaa ctc ctc       2592
Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala Glu Leu Leu
    850                 855                 860

ccc gta tgg tct cag ctg atc gaa gag cat agc ctt caa gac ctc aag       2640
Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln Asp Leu Lys
865                 870                 875                 880

gcg agc cct cag gcg aag cgg ctc gac agt gtg agc ttc gcg cac tac       2688
Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe Ala His Tyr
                885                 890                 895

tgt gag aag gaa cta aac ttg cct gct gtt ctc ggc gta gca aac cag       2736
Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val Ala Asn Gln
            900                 905                 910

atc aca cgc gct ctg ctc ggt gtg gaa gcc cac gag atc agc atg ctt       2784
Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile Ser Met Leu
        915                 920                 925

ttt ctc acc gac tac atc aag agt gcc acc ggt ctc agt aat att ttc       2832
Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe
```

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               930                  935                    940
     tcg gac aag aaa gac ggc ggg cag tat atg cga tgc aaa aca ggt atg    2880
     Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys Thr Gly Met
     945                 950                 955                 960

     cag tcg att tgc cat gcc atg tca aag gaa ctt gtt cca ggc tca gtg    2928
     Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro Gly Ser Val
                         965                 970                 975

     cac ctc aac acc ccc gtc gct gaa att gag cag tcg gca tcc ggc tgt    2976
     His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys
                     980                 985                 990

     aca gta cga tcg gcc tcg ggc gcc gtg ttc cga agc aaa aag gtg gtg    3024
     Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys Lys Val Val
                 995                 1000                1005

     gtt tcg tta ccg aca acc ttg tat ccc acc ttg aca ttt tca cca cct    3072
     Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro
                 1010                1015                1020

     ctt ccc gcc gag aag caa gca ttg gcg gaa aat tct atc ctg ggc tac    3120
     Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr
     1025                1030                1035                1040

     tat agc aag ata gtc ttc gta tgg gac aag ccg tgg tgg cgc gaa caa    3168
     Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp Arg Glu Gln
                         1045                1050                1055

     ggc ttc tcg ggc gtc ctc caa tcg agc tgt gac ccc atc tca ttt gcc    3216
     Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala
                     1060                1065                1070

     aga gat acc agc atc gac gtc gat cga caa tgg tcc att acc tgt ttc    3264
     Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile Thr Cys Phe
                 1075                1080                1085

     atg gtc gga gac ccg gga cgg aag tgg tcc caa cag tcc aag cag gta    3312
     Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser Lys Gln Val
                 1090                1095                1100

     cga caa aag tct gtc tgg gac caa ctc cgc gca gcc tac gag aac gcc    3360
     Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala
     1105                1110                1115                1120

     ggg gcc caa gtc cca gag ccg gcc aac gtg ctc gaa atc gag tgg tcg    3408
     Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile Glu Trp Ser
                         1125                1130                1135

     aag cag cag tat ttc caa gga gct ccg agc gcc gtc tat ggg ctg aac    3456
     Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn
                     1140                1145                1150

     gat ctc atc aca ctg ggt tcg gcg ctc aga acg ccg ttc aag agt gtt    3504
     Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe Lys Ser Val
                 1155                1160                1165

     cat ttc gtt gga acg gag acg tct tta gtt tgg aaa ggg tat atg gaa    3552
     His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly Tyr Met Glu
                 1170                1175                1180
```

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ggg gcc ata cga tcg ggt caa cga ggt gct gca gaa gtt gtg gct agc        3600
Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val Val Ala Ser
1185                    1190                1195                1200

ctg gtg cca gca gca tag                                                 3618
Leu Val Pro Ala Ala
                    1205
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<211> 1205
<212> PRT
<213> Unknown

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Met Ser Pro Ile Leu Gly Tyr Trp Lys Ile Lys Gly Leu Val Gln Pro
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Thr Arg Leu Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu
            20                  25                  30
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
            35                  40                  45
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys
    50                  55                  60
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65                  70                  75                  80
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
                85                  90                  95
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
                100                 105                 110
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
            115                 120                 125
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
    130                 135                 140
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
145                 150                 155                 160
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
                165                 170                 175
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
            180                 185                 190
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
            195                 200                 205
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
    210                 215                 220
Gly Ser Pro Glu Phe Ala Pro Thr Val Lys Ile Asp Ala Gly Met Val
225                 230                 235                 240
Val Gly Thr Thr Thr Thr Val Pro Gly Thr Thr Ala Thr Val Ser Glu
                245                 250                 255
Phe Leu Gly Val Pro Phe Ala Ala Ser Pro Thr Arg Phe Ala Pro Pro
                260                 265                 270
Thr Arg Pro Val Pro Trp Ser Thr Pro Leu Gln Ala Thr Ala Tyr Gly
            275                 280                 285
Pro Ala Cys Pro Gln Gln Phe Asn Tyr Pro Glu Glu Leu Arg Glu Ile
    290                 295                 300
Thr Met Ala Trp Phe Asn Thr Pro Pro Ser Ala Gly Glu Ser Glu
305                 310                 315                 320
Asp Cys Leu Asn Leu Asn Ile Tyr Val Pro Gly Thr Glu Asn Thr Asn
                325                 330                 335
Lys Ala Val Met Val Trp Ile Tyr Gly Gly Ala Leu Glu Tyr Gly Trp
            340                 345                 350
Asn Ser Phe His Leu Tyr Asp Gly Ala Ser Phe Ala Ala Asn Gln Asp
            355                 360                 365
Val Ile Ala Val Thr Ile Asn Tyr Arg Thr Asn Ile Leu Gly Phe Pro
```

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        370                    375                    380
Ala Ala Pro Gln Leu Pro Ile Thr Gln Arg Asn Leu Gly Phe Leu Asp
385                    390                    395                    400
Gln Arg Phe Ala Leu Asp Trp Val Gln Arg Asn Ile Ala Ala Phe Gly
                       405                    410                    415
Gly Asp Pro Arg Lys Val Thr Ile Phe Gly Gln Ser Ala Gly Gly Arg
               420                    425                    430
Ser Val Asp Val Leu Leu Thr Ser Met Pro His Asn Pro Pro Phe Arg
           435                    440                    445
Ala Ala Ile Met Glu Ser Gly Val Ala Asn Tyr Asn Phe Pro Lys Gly
           450                    455                    460
Asp Leu Ser Glu Pro Trp Asn Thr Thr Val Gln Ala Leu Asn Cys Thr
465                    470                    475                    480
Thr Ser Ile Asp Ile Leu Ser Cys Met Arg Arg Val Asp Leu Ala Thr
                   485                    490                    495
Leu Met Asn Thr Ile Glu Gln Leu Gly Leu Gly Phe Glu Tyr Thr Leu
               500                    505                    510
Asp Asn Val Thr Ala Val Tyr Arg Ser Glu Thr Ala Arg Thr Thr Gly
           515                    520                    525
Asp Ile Ala Arg Val Pro Val Leu Val Gly Thr Val Ala Asn Asp Gly
       530                    535                    540
Leu Leu Phe Val Leu Gly Glu Asn Asp Thr Gln Ala Tyr Leu Glu Glu
545                    550                    555                    560
Ala Ile Pro Asn Gln Pro Asp Leu Tyr Gln Thr Leu Leu Gly Ala Tyr
                   565                    570                    575
Pro Ile Gly Ser Pro Gly Ile Gly Ser Pro Gln Asp Gln Ile Ala Ala
               580                    585                    590
Ile Glu Thr Glu Val Arg Phe Gln Cys Pro Ser Ala Ile Val Ala Gln
           595                    600                    605
Asp Ser Arg Asn Arg Gly Ile Pro Ser Trp Arg Tyr Tyr Tyr Asn Ala
       610                    615                    620
Thr Phe Glu Asn Leu Glu Leu Phe Pro Gly Ser Glu Val Tyr His Ser
625                    630                    635                    640
Ser Glu Val Gly Met Val Phe Gly Thr Tyr Pro Val Ala Ser Ala Thr
               645                    650                    655
Ala Leu Glu Ala Gln Thr Ser Lys Tyr Met Gln Gly Ala Trp Ala Ala
           660                    665                    670
Phe Ala Lys Asn Pro Met Asn Gly Pro Gly Trp Lys Gln Val Pro Asn
           675                    680                    685
Val Ala Ala Leu Gly Ser Pro Gly Lys Ala Ile Gln Val Asp Val Ser
       690                    695                    700
Pro Ala Thr Ile Asp Gln Arg Cys Ala Leu Tyr Thr Arg Tyr Tyr Thr
705                    710                    715                    720
Glu Leu Gly Thr Ile Ala Pro Arg Thr Phe Gly Gly Gly Ser Gly Gly
               725                    730                    735
Gly Ser Gly Gly Gly Ser Lys Asp Asn Val Ala Asp Val Val Val Val
               740                    745                    750
Gly Ala Gly Leu Ser Gly Leu Glu Thr Ala Arg Lys Val Gln Ala Ala
           755                    760                    765
Gly Leu Ser Cys Leu Val Leu Glu Ala Met Asp Arg Val Gly Gly Lys
       770                    775                    780
Thr Leu Ser Val Gln Ser Gly Pro Gly Arg Thr Thr Ile Asn Asp Leu
785                    790                    795                    800
Gly Ala Ala Trp Ile Asn Asp Ser Asn Gln Ser Glu Val Ser Arg Leu
               805                    810                    815
Phe Glu Arg Phe His Leu Glu Gly Glu Leu Gln Arg Thr Thr Gly Asn
           820                    825                    830
Ser Ile His Gln Ala Gln Asp Gly Thr Thr Thr Ala Pro Tyr Gly
           835                    840                    845
Asp Ser Leu Leu Ser Glu Glu Val Ala Ser Ala Leu Ala Glu Leu Leu
       850                    855                    860
Pro Val Trp Ser Gln Leu Ile Glu Glu His Ser Leu Gln Asp Leu Lys
```

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865                   870                 875                 880
Ala Ser Pro Gln Ala Lys Arg Leu Asp Ser Val Ser Phe Ala His Tyr
                885                 890                 895
Cys Glu Lys Glu Leu Asn Leu Pro Ala Val Leu Gly Val Ala Asn Gln
            900                 905                 910
Ile Thr Arg Ala Leu Leu Gly Val Glu Ala His Glu Ile Ser Met Leu
        915                 920                 925
Phe Leu Thr Asp Tyr Ile Lys Ser Ala Thr Gly Leu Ser Asn Ile Phe
        930                 935                 940
Ser Asp Lys Lys Asp Gly Gly Gln Tyr Met Arg Cys Lys Thr Gly Met
945                 950                 955                 960
Gln Ser Ile Cys His Ala Met Ser Lys Glu Leu Val Pro Gly Ser Val
                965                 970                 975
His Leu Asn Thr Pro Val Ala Glu Ile Glu Gln Ser Ala Ser Gly Cys
            980                 985                 990
Thr Val Arg Ser Ala Ser Gly Ala Val Phe Arg Ser Lys Lys Val Val
            995                 1000                1005
Val Ser Leu Pro Thr Thr Leu Tyr Pro Thr Leu Thr Phe Ser Pro Pro
        1010                1015                1020
Leu Pro Ala Glu Lys Gln Ala Leu Ala Glu Asn Ser Ile Leu Gly Tyr
    1025                1030                1035                1040
Tyr Ser Lys Ile Val Phe Val Trp Asp Lys Pro Trp Trp Arg Glu Gln
                1045                1050                1055
Gly Phe Ser Gly Val Leu Gln Ser Ser Cys Asp Pro Ile Ser Phe Ala
            1060                1065                1070
Arg Asp Thr Ser Ile Asp Val Asp Arg Gln Trp Ser Ile Thr Cys Phe
        1075                1080                1085
Met Val Gly Asp Pro Gly Arg Lys Trp Ser Gln Gln Ser Lys Gln Val
        1090                1095                1100
Arg Gln Lys Ser Val Trp Asp Gln Leu Arg Ala Ala Tyr Glu Asn Ala
1105                1110                1115                1120
Gly Ala Gln Val Pro Glu Pro Ala Asn Val Leu Glu Ile Glu Trp Ser
            1125                1130                1135
Lys Gln Gln Tyr Phe Gln Gly Ala Pro Ser Ala Val Tyr Gly Leu Asn
            1140                1145                1150
Asp Leu Ile Thr Leu Gly Ser Ala Leu Arg Thr Pro Phe Lys Ser Val
        1155                1160                1165
His Phe Val Gly Thr Glu Thr Ser Leu Val Trp Lys Gly Tyr Met Glu
        1170                1175                1180
Gly Ala Ile Arg Ser Gly Gln Arg Gly Ala Ala Glu Val Val Ala Ser
1185                1190                1195                1200
Leu Val Pro Ala Ala
            1205
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        <210> 30
        <211> 3591
        <212> DNA
        <213> Unknown

        <220>
        <223> Open reading frame of BEST1:K:trAPAO fusion for
              bacterial expression vector pGEX-4T-1 or similar
              vector.
              gst:BEST1:sp:K:trAPAO fusion, 3591 nt. 1-687 gst +
              polylinker,  688-2163, BEST1 mature; 2164-2199,
              spacer, 2200-3588, K:trAPAO

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        <223> gst + polylinker

        <221> mat_peptide
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<222> (688)...(2163)
<223> BEST1 mature

<221> misc_feature
<222> (2164)...(2199)
<223> spacer sequence

<221> misc_feature
<222> (2200)...(3588)
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<221> CDS
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<221> misc_feature
<222> (2200)...(2202)
<223> Extra lysine

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Met Ser Pro Ile Leu Gly Tyr Trp Lys Ile Lys Gly Leu Val Gln Pro
1               5                   10                  15

act cga ctt ctt ttg gaa tat ctt gaa gaa aaa tat gaa gag cat ttg        96
Thr Arg Leu Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu
                20                  25                  30

tat gag cgc gat gaa ggt gat aaa tgg cga aac aaa aag ttt gaa ttg        144
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
            35                  40                  45

ggt ttg gag ttt ccc aat ctt cct tat tat att gat ggt gat gtt aaa        192
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys
        50                  55                  60

tta aca cag tct atg gcc atc ata cgt tat ata gct gac aag cac aac        240
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65                  70                  75                  80

atg ttg ggt ggt tgt cca aaa gag cgt gca gag att tca atg ctt gaa        288
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
                85                  90                  95

gga gcg gtt ttg gat att aga tac ggt gtt tcg aga att gca tat agt        336
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
                100                 105                 110

aaa gac ttt gaa act ctc aaa gtt gat ttt ctt agc aag cta cct gaa        384
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
            115                 120                 125

atg ctg aaa atg ttc gaa gat cgt tta tgt cat aaa aca tat tta aat        432
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
        130                 135                 140

ggt gat cat gta acc cat cct gac ttc atg ttg tat gac gct ctt gat        480
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
145                 150                 155                 160

gtt gtt tta tac atg gac cca atg tgc ctg gat gcg ttc cca aaa tta        528
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
                165                 170                 175
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gtt tgt ttt aaa aaa cgt att gaa gct atc cca caa att gat aag tac          576
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
            180             185             190

ttg aaa tcc agc aag tat ata gca tgg cct ttg cag ggc tgg caa gcc          624
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
            195             200             205

acg ttt ggt ggt ggc gac cat cct cca aaa tcg gat ctg gtt ccg cgt         672
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
        210             215             220

gga tcc ccg gaa ttc acg gat ttt ccg gtc cgc agg acc gat ctg ggc         720
Gly Ser Pro Glu Phe Thr Asp Phe Pro Val Arg Arg Thr Asp Leu Gly
225             230             235             240

cag gtt cag gga ctg gcc ggg gac gtg atg agc ttt cgc gga ata ccc         768
Gln Val Gln Gly Leu Ala Gly Asp Val Met Ser Phe Arg Gly Ile Pro
            245             250             255

tat gca gcg ccg ccg gtg ggc ggg ctg cgt tgg aag ccg ccc caa cac         816
Tyr Ala Ala Pro Pro Val Gly Gly Leu Arg Trp Lys Pro Pro Gln His
            260             265             270

gcc cgg ccc tgg gcg ggc gtt cgc ccc gcc acc caa ttt ggc tcc gac         864
Ala Arg Pro Trp Ala Gly Val Arg Pro Ala Thr Gln Phe Gly Ser Asp
            275             280             285

tgc ttc ggc gcg gcc tat ctt cgc aaa ggc agc ctc gcc ccc ggc gtg         912
Cys Phe Gly Ala Ala Tyr Leu Arg Lys Gly Ser Leu Ala Pro Gly Val
            290             295             300

agc gag gac tgt ctt tac ctc aac gta tgg gcg ccg tca ggc gct aaa         960
Ser Glu Asp Cys Leu Tyr Leu Asn Val Trp Ala Pro Ser Gly Ala Lys
305             310             315             320

ccc ggc cag tac ccc gtc atg gtc tgg gtc tac ggc ggc ggc ttc gcc        1008
Pro Gly Gln Tyr Pro Val Met Val Trp Val Tyr Gly Gly Gly Phe Ala
                325             330             335

ggc ggc acg gcc gcc atg ccc tac tac gac ggc gag gcg ctt gcg cga        1056
Gly Gly Thr Ala Ala Met Pro Tyr Tyr Asp Gly Glu Ala Leu Ala Arg
            340             345             350

cag ggc gtc gtc gtg gtg acg ttt aac tat cgg acg aac atc ctg ggc        1104
Gln Gly Val Val Val Val Thr Phe Asn Tyr Arg Thr Asn Ile Leu Gly
            355             360             365

ttt ttc gcc cat cct ggt ctc tcg cgc gag agc ccc acc gga act tcg        1152
Phe Phe Ala His Pro Gly Leu Ser Arg Glu Ser Pro Thr Gly Thr Ser
            370             375             380

ggc aac tac ggc cta ctc gac att ctc gcc gct ctt cgg tgg gtg cag        1200
Gly Asn Tyr Gly Leu Leu Asp Ile Leu Ala Ala Leu Arg Trp Val Gln
385             390             395             400

agc aac gcc cgc gcc ttc gga ggg gac ccc ggc cga gtg acg gtc ttt        1248
Ser Asn Ala Arg Ala Phe Gly Gly Asp Pro Gly Arg Val Thr Val Phe
            405             410             415

ggt gaa tcg gcc gga gcg agc gcg atc gga ctt ctg ctc acc tcg ccg        1296
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                Gly Glu Ser Ala Gly Ala Ser Ala Ile Gly Leu Leu Leu Thr Ser Pro
                        420             425                 430

ctg agc aag ggt ctc ttc cgt ggc gct atc ctc gaa agt cca ggg ctg          1344
Leu Ser Lys Gly Leu Phe Arg Gly Ala Ile Leu Glu Ser Pro Gly Leu
        435             440                 445

acg cga ccg ctc gcg acg ctc gcc gac agc gcc gcc tcg ggc gag cgc          1392
Thr Arg Pro Leu Ala Thr Leu Ala Asp Ser Ala Ala Ser Gly Glu Arg
        450             455                 460

ctc gac gcc gat ctt tcg cga ctg cgc tcg acc gac cca gcc acc ctg          1440
Leu Asp Ala Asp Leu Ser Arg Leu Arg Ser Thr Asp Pro Ala Thr Leu
465             470                 475                 480

atg gcg cgc gcc gac gcg gcc cgc ccg gca tcg cgg gac ctg cgc agg          1488
Met Ala Arg Ala Asp Ala Ala Arg Pro Ala Ser Arg Asp Leu Arg Arg
                485                 490                 495

ccg cgt ccg acc gga ccg atc gtc gat ggc cat gtg ctg ccg cag acc          1536
Pro Arg Pro Thr Gly Pro Ile Val Asp Gly His Val Leu Pro Gln Thr
            500                 505                 510

gac agc gcg gcg atc gcg gcg ggg cag ctg gcg ccg gtt cgg gtc ctg          1584
Asp Ser Ala Ala Ile Ala Ala Gly Gln Leu Ala Pro Val Arg Val Leu
        515                 520                 525

atc gga acc aat gcc gac gaa ggc cgc gcc ttc ctc ggg cgc gcg ccg          1632
Ile Gly Thr Asn Ala Asp Glu Gly Arg Ala Phe Leu Gly Arg Ala Pro
        530                 535                 540

atg gag acg cca gcg gac tac caa gcc tat ctg gag gcg cag ttt ggc          1680
Met Glu Thr Pro Ala Asp Tyr Gln Ala Tyr Leu Glu Ala Gln Phe Gly
545                 550                 555                 560

gac caa gcc gcc gcc gtg gcg gcg tgc tat ccc ctc gac ggc cgg gcc          1728
Asp Gln Ala Ala Ala Val Ala Ala Cys Tyr Pro Leu Asp Gly Arg Ala
                565                 570                 575

acg ccc aag gaa atg gtc gcg cgc atc ttc ggc gac aat cag ttc aat          1776
Thr Pro Lys Glu Met Val Ala Arg Ile Phe Gly Asp Asn Gln Phe Asn
            580                 585                 590

cgg ggg gtc tcg gcc ttc tcg gaa gcg ctt gtg cgc cag ggc gcg ccc          1824
Arg Gly Val Ser Ala Phe Ser Glu Ala Leu Val Arg Gln Gly Ala Pro
        595                 600                 605

gtg tgg cgt tat cag ttc aac ggt aat acc gag ggt gga aga gcg ccg          1872
Val Trp Arg Tyr Gln Phe Asn Gly Asn Thr Glu Gly Gly Arg Ala Pro
        610                 615                 620

gct acc cac gga gcc gaa att ccc tac gtt ttc ggg gtg ttc aag ctc          1920
Ala Thr His Gly Ala Glu Ile Pro Tyr Val Phe Gly Val Phe Lys Leu
625                 630                 635                 640

gac gag ttg ggt ctg ttc gat tgg ccg ccc gag ggg ccc acg ccc gcc          1968
Asp Glu Leu Gly Leu Phe Asp Trp Pro Pro Glu Gly Pro Thr Pro Ala
                645                 650                 655

gac cgt gcg ctg ggc caa ctg atg tcc tcc gcc tgg gtc cgg ttc gcc          2016
Asp Arg Ala Leu Gly Gln Leu Met Ser Ser Ala Trp Val Arg Phe Ala
                660                 665                 670
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aag aat ggc gac ccc gcc ggg gac gcc ctt acc tgg cct gcc tat tct        2064
Lys Asn Gly Asp Pro Ala Gly Asp Ala Leu Thr Trp Pro Ala Tyr Ser
        675             680                 685

acg ggc aag tcg acc atg aca ttc ggt ccc gag ggc cgc gcg gcg gtg        2112
Thr Gly Lys Ser Thr Met Thr Phe Gly Pro Glu Gly Arg Ala Ala Val
        690             695                 700

gtg tcg ccc gga cct tcc atc ccc cct tgc gcg gat ggc gcc aag gcg        2160
Val Ser Pro Gly Pro Ser Ile Pro Pro Cys Ala Asp Gly Ala Lys Ala
705                 710                 715                 720

ggg ggc gga ggc agc ggc gga ggc agc ggc gga ggc agc aaa gac aac        2208
Gly Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Gly Ser Lys Asp Asn
                725                 730                 735

gtt gcg gac gtg gta gtg gtg ggc gct ggc ttg agc ggt ttg gag acg        2256
Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr
            740                 745                 750

gca cgc aaa gtc cag gcc gcc ggt ctg tcc tgc ctc gtt ctt gag gcg        2304
Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala
        755                 760                 765

atg gat cgt gta ggg gga aag act ctg agc gta caa tcg ggt ccc ggc        2352
Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly
        770                 775                 780

agg acg act atc aac gac ctc ggc gct gcg tgg atc aat gac agc aac        2400
Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn
785                 790                 795                 800

caa agc gaa gta tcc aga ttg ttt gaa aga ttt cat ttg gag ggc gag        2448
Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu
                805                 810                 815

ctc cag agg acg act gga aat tca atc cat caa gca caa gac ggt aca        2496
Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr
            820                 825                 830

acc act aca gct cct tat ggt gac tcc ttg ctg agc gag gag gtt gca        2544
Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala
            835                 840                 845

agt gca ctt gcg gaa ctc ctc ccc gta tgg tct cag ctg atc gaa gag        2592
Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu
        850                 855                 860

cat agc ctt caa gac ctc aag gcg agc cct cag gcg aag cgg ctc gac        2640
His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp
865                 870                 875                 880

agt gtg agc ttc gcg cac tac tgt gag aag gaa cta aac ttg cct gct        2688
Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala
                885                 890                 895

gtt ctc ggc gta gca aac cag atc aca cgc gct ctg ctc ggt gtg gaa        2736
Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu
            900                 905                 910

gcc cac gag atc agc atg ctt ttt ctc acc gac tac atc aag agt gcc        2784
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    Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala
            915                 920                 925

    acc ggt ctc agt aat att ttc tcg gac aag aaa gac ggc ggg cag tat    2832
    Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr
            930                 935                 940

    atg cga tgc aaa aca ggt atg cag tcg att tgc cat gcc atg tca aag    2880
    Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys
    945                 950                 955                 960

    gaa ctt gtt cca ggc tca gtg cac ctc aac acc ccc gtc gct gaa att    2928
    Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile
                        965                 970                 975

    gag cag tcg gca tcc ggc tgt aca gta cga tcg gcc tcg ggc gcc gtg    2976
    Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val
                980                 985                 990

    ttc cga agc aaa aag gtg gtg gtt tcg tta ccg aca acc ttg tat ccc    3024
    Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro
                995                 1000                1005

    acc ttg aca ttt tca cca cct ctt ccc gcc gag aag caa gca ttg gcg    3072
    Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala
            1010                1015                1020

    gaa aat tct atc ctg ggc tac tat agc aag ata gtc ttc gta tgg gac    3120
    Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp
    1025                1030                1035                1040

    aag ccg tgg tgg cgc gaa caa ggc ttc tcg ggc gtc ctc caa tcg agc    3168
    Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser
                    1045                1050                1055

    tgt gac ccc atc tca ttt gcc aga gat acc agc atc gac gtc gat cga    3216
    Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg
                1060                1065                1070

    caa tgg tcc att acc tgt ttc atg gtc gga gac ccg gga cgg aag tgg    3264
    Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp
            1075                1080                1085

    tcc caa cag tcc aag cag gta cga caa aag tct gtc tgg gac caa ctc    3312
    Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu
            1090                1095                1100

    cgc gca gcc tac gag aac gcc ggg gcc caa gtc cca gag ccg gcc aac    3360
    Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn
    1105                1110                1115                1120

    gtg ctc gaa atc gag tgg tcg aag cag cag tat ttc caa gga gct ccg    3408
    Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro
                    1125                1130                1135

    agc gcc gtc tat ggg ctg aac gat ctc atc aca ctg ggt tcg gcg ctc    3456
    Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu
                1140                1145                1150

    aga acg ccg ttc aag agt gtt cat ttc gtt gga acg gag acg tct tta    3504
    Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu
            1155                1160                1165
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gtt tgg aaa ggg tat atg gaa ggg gcc ata cga tcg ggt caa cga ggt        3552
Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly
    1170                1175                1180

gct gca gaa gtt gtg gct agc ctg gtg cca gca gca tag                    3591
Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
1185                1190                1195
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        <211> 1196
        <212> PRT
        <213> Unknown

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Thr Arg Leu Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu
        20                25                30
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
        35                40                45
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys

        50                55                60
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65                70                75                80
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
                85                90                95
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
                100                105                110
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
        115                120                125
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
        130                135                140
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
145                150                155                160
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
                165                170                175
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
                180                185                190
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
        195                200                205
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
        210                215                220
Gly Ser Pro Glu Phe Thr Asp Phe Pro Val Arg Arg Thr Asp Leu Gly
225                230                235                240
Gln Val Gln Gly Leu Ala Gly Asp Val Met Ser Phe Arg Gly Ile Pro
                245                250                255
Tyr Ala Ala Pro Pro Val Gly Gly Leu Arg Trp Lys Pro Pro Gln His
                260                265                270
Ala Arg Pro Trp Ala Gly Val Arg Pro Ala Thr Gln Phe Gly Ser Asp
        275                280                285
Cys Phe Gly Ala Ala Tyr Leu Arg Lys Gly Ser Leu Ala Pro Gly Val
        290                295                300
Ser Glu Asp Cys Leu Tyr Leu Asn Val Trp Ala Pro Ser Gly Ala Lys
305                310                315                320
Pro Gly Gln Tyr Pro Val Met Val Trp Val Tyr Gly Gly Gly Phe Ala
                325                330                335
Gly Gly Thr Ala Ala Met Pro Tyr Tyr Asp Gly Glu Ala Leu Ala Arg
                340                345                350
Gln Gly Val Val Val Val Thr Phe Asn Tyr Arg Thr Asn Ile Leu Gly
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          355                      360                      365
Phe Phe Ala His Pro Gly Leu Ser Arg Glu Ser Pro Thr Gly Thr Ser
    370                      375                      380
Gly Asn Tyr Gly Leu Leu Asp Ile Leu Ala Ala Leu Arg Trp Val Gln
385                      390                      395                      400
Ser Asn Ala Arg Ala Phe Gly Gly Asp Pro Gly Arg Val Thr Val Phe
                405                      410                      415
Gly Glu Ser Ala Gly Ala Ser Ala Ile Gly Leu Leu Leu Thr Ser Pro
                420                      425                      430
Leu Ser Lys Gly Leu Phe Arg Gly Ala Ile Leu Glu Ser Pro Gly Leu
            435                      440                      445
Thr Arg Pro Leu Ala Thr Leu Ala Asp Ser Ala Ala Ser Gly Glu Arg
    450                      455                      460
Leu Asp Ala Asp Leu Ser Arg Leu Arg Ser Thr Asp Pro Ala Thr Leu
465                      470                      475                      480
Met Ala Arg Ala Asp Ala Ala Arg Pro Ala Ser Arg Asp Leu Arg Arg
                485                      490                      495
Pro Arg Pro Thr Gly Pro Ile Val Asp Gly His Val Leu Pro Gln Thr
                500                      505                      510
Asp Ser Ala Ala Ile Ala Ala Gly Gln Leu Ala Pro Val Arg Val Leu
            515                      520                      525
Ile Gly Thr Asn Ala Asp Glu Gly Arg Ala Phe Leu Gly Arg Ala Pro
    530                      535                      540
Met Glu Thr Pro Ala Asp Tyr Gln Ala Tyr Leu Glu Ala Gln Phe Gly
545                      550                      555                      560
Asp Gln Ala Ala Ala Val Ala Ala Cys Tyr Pro Leu Asp Gly Arg Ala
                565                      570                      575
Thr Pro Lys Glu Met Val Ala Arg Ile Phe Gly Asp Asn Gln Phe Asn
            580                      585                      590
Arg Gly Val Ser Ala Phe Ser Glu Ala Leu Val Arg Gln Gly Ala Pro
        595                      600                      605
Val Trp Arg Tyr Gln Phe Asn Gly Asn Thr Glu Gly Gly Arg Ala Pro
    610                      615                      620
Ala Thr His Gly Ala Glu Ile Pro Tyr Val Phe Gly Val Phe Lys Leu
625                      630                      635                      640
Asp Glu Leu Gly Leu Phe Asp Trp Pro Pro Glu Gly Pro Thr Pro Ala
            645                      650                      655
Asp Arg Ala Leu Gly Gln Leu Met Ser Ser Ala Trp Val Arg Phe Ala
            660                      665                      670
Lys Asn Gly Asp Pro Ala Gly Asp Ala Leu Thr Trp Pro Ala Tyr Ser
    675                      680                      685
Thr Gly Lys Ser Thr Met Thr Phe Gly Pro Glu Gly Arg Ala Ala Val
    690                      695                      700
Val Ser Pro Gly Pro Ser Ile Pro Pro Cys Ala Asp Gly Ala Lys Ala
705                      710                      715                      720
Gly Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Gly Ser Lys Asp Asn
            725                      730                      735
Val Ala Asp Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu Thr
            740                      745                      750
Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu Ala
    755                      760                      765
Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro Gly
    770                      775                      780
Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Asn Asp Ser Asn
785                      790                      795                      800
Gln Ser Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly Glu
                805                      810                      815
Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly Thr
            820                      825                      830
Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val Ala
    835                      840                      845
Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu Glu
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      850               855               860
His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu Asp
865               870               875               880
Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro Ala
              885               890               895
Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val Glu
          900               905               910
Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser Ala
      915               920               925
Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln Tyr
      930               935               940
Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met Ser Lys
945               950               955               960
Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala Glu Ile
              965               970               975
Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala Val
              980               985               990
Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr Pro
          995               1000              1005
Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu Ala
      1010              1015              1020
Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp Asp
1025              1030              1035              1040
Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser Ser
              1045              1050              1055
Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp Arg
          1060              1065              1070
Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys Trp
      1075              1080              1085
Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln Leu
      1090              1095              1100
Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala Asn
1105              1110              1115              1120
Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala Pro
              1125              1130              1135
Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala Leu
          1140              1145              1150
Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr Ser Leu
          1155              1160              1165
Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg Gly
      1170              1175              1180
Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
1185              1190              1195
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      <210> 32
      <211> 2490
      <212> DNA
      <213> Unknown

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      <223> GST:glyc(-)APAO open reading frame, 2490 nt; GST
            and linker, nt 1-687; Glyc (-) APAO, nt 688-2490;
            mutation in putative glycosylation sites in bold
            and underlined, nt  1288-1290 (AAT->TCC) and nt
            1303-1305 (AGC->AAC).

      <221> CDS
      <222> (1)...(2487)

      <221> misc_feature
      <222> (1)...(687)
      <223> GST and linker
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<221> misc_feature
<222> (688)...(2490)
<223> Glyc (-) APAO

<221> mutation
<222> (1288)...(1290)
<223> mutation in putative glycosylation site (AAT->TCC)

<221> mutation
<222> (1303)...(1305)
<223> mutation in putative glycosylation site (AGC->AAC)

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atg tcc cct ata cta ggt tat tgg aaa att aag ggc ctt gtg caa ccc          48
Met Ser Pro Ile Leu Gly Tyr Trp Lys Ile Lys Gly Leu Val Gln Pro
1               5                   10                  15

act cga ctt ctt ttg gaa tat ctt gaa gaa aaa tat gaa gag cat ttg          96
Thr Arg Leu Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu
                20                  25                  30

tat gag cgc gat gaa ggt gat aaa tgg cga aac aaa aag ttt gaa ttg         144
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
            35                  40                  45

ggt ttg gag ttt ccc aat ctt cct tat tat att gat ggt gat gtt aaa         192
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys
        50                  55                  60

tta aca cag tct atg gcc atc ata cgt tat ata gct gac aag cac aac         240
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65                  70                  75                  80

atg ttg ggt ggt tgt cca aaa gag cgt gca gag att tca atg ctt gaa         288
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
                85                  90                  95

gga gcg gtt ttg gat att aga tac ggt gtt tcg aga att gca tat agt         336
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
            100                 105                 110

aaa gac ttt gaa act ctc aaa gtt gat ttt ctt agc aag cta cct gaa         384
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
            115                 120                 125

atg ctg aaa atg ttc gaa gat cgt tta tgt cat aaa aca tat tta aat         432
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
        130                 135                 140

ggt gat cat gta acc cat cct gac ttc atg ttg tat gac gct ctt gat         480
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
145                 150                 155                 160

gtt gtt tta tac atg gac cca atg tgc ctg gat gcg ttc cca aaa tta         528
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
                165                 170                 175

gtt tgt ttt aaa aaa cgt att gaa gct atc cca caa att gat aag tac         576
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
            180                 185                 190
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ttg aaa tcc agc aag tat ata gca tgg cct ttg cag ggc tgg caa gcc    624
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
        195                 200                 205

acg ttt ggt ggt ggc gac cat cct cca aaa tcg gat ctg gtt ccg cgt    672
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
    210                 215                 220

gga tcc ccg gaa ttc atg gca ctt gca ccg agc tac atc aat ccc cca    720
Gly Ser Pro Glu Phe Met Ala Leu Ala Pro Ser Tyr Ile Asn Pro Pro
225                 230                 235                 240

aac gtc gcc tcc cca gca ggg tat tct cac gtc ggc gta ggc cca gac    768
Asn Val Ala Ser Pro Ala Gly Tyr Ser His Val Gly Val Gly Pro Asp
                245                 250                 255

gga ggg agg tat gtg aca ata gct gga cag att gga caa gac gct tcg    816
Gly Gly Arg Tyr Val Thr Ile Ala Gly Gln Ile Gly Gln Asp Ala Ser
                260                 265                 270

ggc gtg aca gac cct gcc tac gag aaa cag gtt gcc caa gca ttc gcc    864
Gly Val Thr Asp Pro Ala Tyr Glu Lys Gln Val Ala Gln Ala Phe Ala
                275                 280                 285

aat ctg cga gct tgc ctt gct gca gtt gga gcc act tca aac gac gtc    912
Asn Leu Arg Ala Cys Leu Ala Ala Val Gly Ala Thr Ser Asn Asp Val
    290                 295                 300

acc aag ctc aat tac tac atc gtc gac tac gcc ccg agc aaa ctc acc    960
Thr Lys Leu Asn Tyr Tyr Ile Val Asp Tyr Ala Pro Ser Lys Leu Thr
305                 310                 315                 320

gca att gga gat ggg ctg aag gct acc ttt gcc ctt gac agg ctc cct   1008
Ala Ile Gly Asp Gly Leu Lys Ala Thr Phe Ala Leu Asp Arg Leu Pro
                325                 330                 335

cct tgc acg ctg gtg cca gtg tcg gcc ttg tct tca cct gaa tac ctc   1056
Pro Cys Thr Leu Val Pro Val Ser Ala Leu Ser Ser Pro Glu Tyr Leu
            340                 345                 350

ttt gag gtt gat gcc acg gcg ctg gtg ccg gga cac acg acc cca gac   1104
Phe Glu Val Asp Ala Thr Ala Leu Val Pro Gly His Thr Thr Pro Asp
            355                 360                 365

aac gtt gcg gac gtg gta gtg gtg ggc gct ggc ttg agc ggt ttg gag   1152
Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu
            370                 375                 380

acg gca cgc aaa gtc cag gcc gcc ggt ctg tcc tgc ctc gtt ctt gag   1200
Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu
385                 390                 395                 400

gcg atg gat cgt gta ggg gga aag act ctg agc gta caa tcg ggt ccc   1248
Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro
                405                 410                 415

ggc agg acg act atc aac gac ctc ggc gct gcg tgg atc tcc gac agc   1296
Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Ser Asp Ser
                420                 425                 430

aac caa aac gaa gta tcc aga ttg ttt gaa aga ttt cat ttg gag ggc   1344
Asn Gln Asn Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly
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                    435                      440                      445
gag ctc cag agg acg act gga aat tca atc cat caa gca caa gac ggt        1392
Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly
        450                      455                      460

aca acc act aca gct cct tat ggt gac tcc ttg ctg agc gag gag gtt        1440
Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val
465                      470                      475                480

gca agt gca ctt gcg gaa ctc ctc ccc gta tgg tct cag ctg atc gaa        1488
Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu
                        485                      490                      495

gag cat agc ctt caa gac ctc aag gcg agc cct cag gcg aag cgg ctc        1536
Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu
            500                      505                      510

gac agt gtg agc ttc gcg cac tac tgt gag aag gaa cta aac ttg cct        1584
Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro
            515                      520                      525

gct gtt ctc ggc gta gca aac cag atc aca cgc gct ctg ctc ggt gtg        1632
Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val
    530                      535                      540

gaa gcc cac gag atc agc atg ctt ttt ctc acc gac tac atc aag agt        1680
Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser
545                      550                      555                560

gcc acc ggt ctc agt aat att ttc tcg gac aag aaa gac ggc ggg cag        1728
Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln
                        565                      570                      575

tat atg cga tgc aaa aca ggt atg cag tcg att tgc cat gcc atg tca        1776
Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met Ser
                580                      585                      590

aag gaa ctt gtt cca ggc tca gtg cac ctc aac acc ccc gtc gct gaa        1824
Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala Glu
            595                      600                      605

att gag cag tcg gca tcc ggc tgt aca gta cga tcg gcc tcg ggc gcc        1872
Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala
            610                      615                      620

gtg ttc cga agc aaa aag gtg gtg gtt tcg tta ccg aca acc ttg tat        1920
Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr
625                      630                      635                640

ccc acc ttg aca ttt tca cca cct ctt ccc gcc gag aag caa gca ttg        1968
Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu
                    645                      650                      655

gcg gaa aat tct atc ctg ggc tac tat agc aag ata gtc ttc gta tgg        2016
Ala Glu Asn Ser Ile Leu Gly Tyr Tyr Ser Lys Ile Val Phe Val Trp
                660                      665                      670

gac aag ccg tgg tgg cgc gaa caa ggc ttc tcg ggc gtc ctc caa tcg        2064
Asp Lys Pro Trp Trp Arg Glu Gln Gly Phe Ser Gly Val Leu Gln Ser
            675                      680                      685
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agc tgt gac ccc atc tca ttt gcc aga gat acc agc atc gac gtc gat      2112
Ser Cys Asp Pro Ile Ser Phe Ala Arg Asp Thr Ser Ile Asp Val Asp
    690                 695                 700

cga caa tgg tcc att acc tgt ttc atg gtc gga gac ccg gga cgg aag      2160
Arg Gln Trp Ser Ile Thr Cys Phe Met Val Gly Asp Pro Gly Arg Lys
705                 710                 715                 720

tgg tcc caa cag tcc aag cag gta cga caa aag tct gtc tgg gac caa      2208
Trp Ser Gln Gln Ser Lys Gln Val Arg Gln Lys Ser Val Trp Asp Gln
                725                 730                 735

ctc cgc gca gcc tac gag aac gcc ggg gcc caa gtc cca gag ccg gcc      2256
Leu Arg Ala Ala Tyr Glu Asn Ala Gly Ala Gln Val Pro Glu Pro Ala
                740                 745                 750

aac gtg ctc gaa atc gag tgg tcg aag cag cag tat ttc caa gga gct      2304
Asn Val Leu Glu Ile Glu Trp Ser Lys Gln Gln Tyr Phe Gln Gly Ala
                755                 760                 765

ccg agc gcc gtc tat ggg ctg aac gat ctc atc aca ctg ggt tcg gcg      2352
Pro Ser Ala Val Tyr Gly Leu Asn Asp Leu Ile Thr Leu Gly Ser Ala
    770                 775                 780

ctc aga acg ccg ttc aag agt gtt cat ttc gtt gga acg gag acg tct      2400
Leu Arg Thr Pro Phe Lys Ser Val His Phe Val Gly Thr Glu Thr Ser
785                 790                 795                 800

tta gtt tgg aaa ggg tat atg gaa ggg gcc ata cga tcg ggt caa cga      2448
Leu Val Trp Lys Gly Tyr Met Glu Gly Ala Ile Arg Ser Gly Gln Arg
                805                 810                 815

ggt gct gca gaa gtt gtg gct agc ctg gtg cca gca gca tag           2490
Gly Ala Ala Glu Val Val Ala Ser Leu Val Pro Ala Ala
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            20                  25                  30
Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu
        35                  40                  45
Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys
    50                  55                  60
Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn
65                  70                  75                  80
Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu
                85                  90                  95
Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser
            100                 105                 110
Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu
        115                 120                 125
Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn
    130                 135                 140
Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp
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145                    150                    155                    160
Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu
                165                    170                    175
Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr
            180                    185                    190
Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala
            195                    200                    205
Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg
        210                    215                    220
Gly Ser Pro Glu Phe Met Ala Leu Ala Pro Ser Tyr Ile Asn Pro Pro
225                    230                    235                    240
Asn Val Ala Ser Pro Ala Gly Tyr Ser His Val Gly Val Gly Pro Asp
                245                    250                    255
Gly Gly Arg Tyr Val Thr Ile Ala Gly Gln Ile Gly Gln Asp Ala Ser
            260                    265                    270
Gly Val Thr Asp Pro Ala Tyr Glu Lys Gln Val Ala Gln Ala Phe Ala
            275                    280                    285
Asn Leu Arg Ala Cys Leu Ala Ala Val Gly Ala Thr Ser Asn Asp Val
        290                    295                    300
Thr Lys Leu Asn Tyr Tyr Ile Val Asp Tyr Ala Pro Ser Lys Leu Thr
305                    310                    315                    320
Ala Ile Gly Asp Gly Leu Lys Ala Thr Phe Ala Leu Asp Arg Leu Pro
                325                    330                    335
Pro Cys Thr Leu Val Pro Val Ser Ala Leu Ser Ser Pro Glu Tyr Leu
            340                    345                    350
Phe Glu Val Asp Ala Thr Ala Leu Val Pro Gly His Thr Thr Pro Asp
            355                    360                    365
Asn Val Ala Asp Val Val Val Val Gly Ala Gly Leu Ser Gly Leu Glu
        370                    375                    380
Thr Ala Arg Lys Val Gln Ala Ala Gly Leu Ser Cys Leu Val Leu Glu
385                    390                    395                    400
Ala Met Asp Arg Val Gly Gly Lys Thr Leu Ser Val Gln Ser Gly Pro
                405                    410                    415
Gly Arg Thr Thr Ile Asn Asp Leu Gly Ala Ala Trp Ile Ser Asp Ser
            420                    425                    430
Asn Gln Asn Glu Val Ser Arg Leu Phe Glu Arg Phe His Leu Glu Gly
            435                    440                    445
Glu Leu Gln Arg Thr Thr Gly Asn Ser Ile His Gln Ala Gln Asp Gly
        450                    455                    460
Thr Thr Thr Thr Ala Pro Tyr Gly Asp Ser Leu Leu Ser Glu Glu Val
465                    470                    475                    480
Ala Ser Ala Leu Ala Glu Leu Leu Pro Val Trp Ser Gln Leu Ile Glu
                485                    490                    495
Glu His Ser Leu Gln Asp Leu Lys Ala Ser Pro Gln Ala Lys Arg Leu
            500                    505                    510
Asp Ser Val Ser Phe Ala His Tyr Cys Glu Lys Glu Leu Asn Leu Pro
            515                    520                    525
Ala Val Leu Gly Val Ala Asn Gln Ile Thr Arg Ala Leu Leu Gly Val
            530                    535                    540
Glu Ala His Glu Ile Ser Met Leu Phe Leu Thr Asp Tyr Ile Lys Ser
545                    550                    555                    560
Ala Thr Gly Leu Ser Asn Ile Phe Ser Asp Lys Lys Asp Gly Gly Gln
                565                    570                    575
Tyr Met Arg Cys Lys Thr Gly Met Gln Ser Ile Cys His Ala Met Ser
            580                    585                    590
Lys Glu Leu Val Pro Gly Ser Val His Leu Asn Thr Pro Val Ala Glu
            595                    600                    605
Ile Glu Gln Ser Ala Ser Gly Cys Thr Val Arg Ser Ala Ser Gly Ala
            610                    615                    620
Val Phe Arg Ser Lys Lys Val Val Val Ser Leu Pro Thr Thr Leu Tyr
625                    630                    635                    640
Pro Thr Leu Thr Phe Ser Pro Pro Leu Pro Ala Glu Lys Gln Ala Leu
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